Current status and challenges of pesticide management in China

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Abstract: China feeds 19% of the world's population with only 9% of its arable land and 6% fresh water. Food safety and food security are the top priorities for the Chinese government. How to increase crop production while maintain food quality and safety without harming the environment remains one of the biggest challenges for China. Driven by the "Capacity building on effective, accountable, and transparent government", "Green Development" strategy and "High-quality Development" strategy, pesticide management has made significant improvements in terms of legislation, market inspection, food safety, environmental monitoring, integrated pest management, technical support, and extension in China. In 2021, there were over 740 active ingredients of pesticides, over 41 433 products, and 2.498 million ton in technical grade pesticides, which were registered and manufactured by 1 705 companies. These pesticides were not only used domestically in China, but also exported to over 180 countries or regions to fight against pest problems, with a total export value of 23.4 billion U.S. dollars in 2021. The percentage of highly toxic pesticides in the overall production has dropped to ~1.3%, and the ten highly toxic pesticides will be phased out within the next five years. In this review, we summarized the major challenges and opportunities in the pesticide management in China.

Key words: pesticide management; pesticide registration; pesticide risk assessment

我国农药管理现状及面临的挑战

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摘要：我国有占世界19%的人口，但仅有占世界9%的耕地，因此保证国家粮食安全是头等大事。在确保生态环境安全的前提下，如何增加作物产量和保障农产品质量安全始终是我国农业快速发展面临的一大挑战。在高效、负责、透明的政府能力建设中，我国农业的绿色发展和高质量发展战略，我国农药管理的法制建设、市场监管、食品安全、环境监测、有害生物治理、应用技术服务及推广等都取得了显著进步。到2021年底，我国已经登记了740多个农药有效成分，41 433个农药产品。2021年，全国1 705家农药定点企业，共生产了化学农药原药249.8万t。不仅满足了国内有害生物防控的实际需要，还出口180多个国家和地区，农药出口额达到234亿美金。我国还有的10个高毒农药品种，已经控制在1.3%以下，且安排在未来5年内会陆续退市。本文还分析梳理了今后我国农药管理发展所面临的挑战。

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关键词：农药管理；农药登记；农药风险评估

According to the revised *Regulation of Pesticide Administration* approved in February 2017 by the State Council, the Ministry of Agriculture and Rural Affairs (MARA) is in charge of the pesticide management in China. The MARA has established a more stringent threshold for pesticide registration, in which risk assessment is a necessary process of evaluation, and the temporary registration has been abolished since June 2017.

By the end of 2021, the MARA has regulated 40 pesticides as Restricted Use with identified risk to the environment, human health, food safety, and crop heath. Until now, there are over 740 active ingredients of pesticides, over 41 433 products, and 2.498 million ton in technical grade pesticides, which were registered and produced by 1 705 manufacturers (Table 1). The percentage of highly toxic pesticides in active ingredient calculation has decreased from 35% to 1.3%, and the existing ten highly acute toxic pesticides will be phased out completely in five years.

Table 1 Pesticides registered in China in 2021

Classification	Number	Percentage/%
Insecticide	15 653	38.4
Fungicide	10 874	26.0
Herbicide	11 173	26.7
Plant growth regular	1 163	2.8
Public health pesticide	2 570	6.1
Total	41 433	100.0

Economic and ecological monitoring and registration systems have covered the entire pesticide registration process including application, evaluation, approval, and certificate issue. As one of the routine activities of regulation enforcement, risk monitoring on residue, environment, occupational health, and crop damage has been conducted by MARA, Institute for the Control of Agrochemicals, Ministry of Agriculture and Rural Affairs (ICAMA), Departments of Agriculture of local governments, and local Institute for the Control of Agrochemicals (ICA). MARA and ICAMA conduct food safety monitoring as part of their missions to enhance food quality, reduce pesticide residues on high value crops, and support farmers increasing income.

The revised *Regulation of Pesticide Administration* adopts heavier punishment on illegal pesticide production, trade and business. National Pesticide Quality Tracing system (www. icama. cn) applies Quick Response Code tracking on labels to monitor pesticide manufacture, use and purchase. The Chinese National Customs and MARA supervise pesticide export and import through a Pesticide Import and Export Registration Verification System. With the newly notification of MARA, No. 269 in 2020, the pesticide export values have increased sharply from 11.7 billion dollars in 2020 to 23.4 billion dollars in 2021. In China, pesticide application in the fields has been reduced since 2015 with technological integration and extension of lower risk alternatives, precision spray technology, efficient formulation, integrated pest management (IPM), biological control, professional service on pest control and free farmer training.

1 Pesticide Legislation

1.1 Regulations

The revised *Regulation on Pesticide Administration* (Order of the State Council No. 677) was issued by the State Council in February 2017. This is the second revision of the regulation after 2001. The updated regulation aims to cover pesticide life cycle management, including registration, production, trade, use and supervision. There are four major changes in the updated regulation: the Ministry of Agriculture and Rural Affairs (MARA) is responsible for pesticide whole industry chain management; temporary registrations were abolished; pesticide use was limited to protect the environment and human health, and risk monitoring systems were established (the State Council of China, 2017).

The MARA issued ministerial regulations and notifications to facilitate implementation of the regulation. In 2017, five relevant secondary regulations were issued as orders of the Ministry of Agriculture (No. 3−No. 7) (the Ministry of Agriculture of China, 2017a, b, c, d, e), which regulated pesticide registra-

tion, production permit, operation permit, registration test and trial, and product label and instruction. In addition, more stringent regulatory guidelines were established by the MARA as the Ministerial Notifications.

No. 2567 Notification-Catalog of Restricted Use Pesticides (2017). It includes 32 active ingredients used as pesticides. The notification requires that products containing these active ingredients should be marked as "Restricted Use" on the labels, their operation and uses are controlled by local governments. No. 2568 Notification-Rules on Evaluation of Pesticide Production Permit. It provides the guidance for provincial authorities to evaluate the production permit. No. 2569 Notification-Data Requirement. It provides the detailed data information requirements to support an application for pesticide registration, amendment, and renewal. It replaced the older Data Requirement issued in 2007. No. 2570 Notification-Rules on Testing Laboratory Assignment for Pesticide Registration and Code of Test Quality Management for Pesticide Registration. It provides the minimal information and capacity requirement for registration tests and laboratories. No. 2571 Notification-Regulates the Application of Digital Codes on the Product Label. It meets market monitoring requirement (the Ministry of Agriculture of China, 2017f).

In addition, there are laws and regulations enforced by other authorities related to pesticide whole industry chain management. The Ministry of Ecology and Environment (MEE) is responsible for pollution control from pesticide production and disposal under the Environmental Protection Law. Food safety inspection and pesticide quality inspection in the market are conducted by the State Administration for Market Regulation under the Food Safety Law. Crop and food residue monitoring and regulation are conducted by the MARA under the law on quality and safety of agricultural products. The patent of the new substance, formula, formulation or usage are authorized by the National Patent Law. The pesticide advertisement is evaluated and regulated by the State Authorization of Market Regulation under the law of advertisement. Based on data from ICAMA in 2021 (www.chinapesticide.org.cn), there were approximately 740 active ingredients, 41 433 pesticide products, and 2.498 million ton in technical grade pesticides, which were registered and produced by 1 705 manufacturers (the Ministry of Agriculture of China, 2017g).

1.2 Relevant International Conventions

1.2.1 Phase Out of Highly Hazardous Pesticides

According to the *Regulation of Pesticide Administration*, extreme toxicity and high toxicity pesticides are banned from being used in vegetables, fruit, tea, fungi, medical herbals, aquatic plants, and for public health pests. In China, the phase out of highly hazardous pesticides (HHPs) are identified following Food and Agriculture Organization of the United Nations (FAO) HHPs guidelines. Currently, 12 existing high toxicity pesticides regulated as the "Restricted Use". HHPs products label should have hazard warning. The HHPs annual production is 30 000 tons, representing less than 1.3% of gross pesticide production. Pesticide management priority has shifted from HHPs control to risk management. To strengthen food and environmental safety, MARA is planning to accelerate the phase out of existing HHPs in five years.

1.2.2 Rotterdam Convention

The Rotterdam Convention formally came into force in China in June 2005. Prior Informed Consent (PIC) procedure was implemented by the MARA for hazardous pesticides and the MEE for other hazardous chemicals. All the highly hazardous pesticides in the Annex III of the Rotterdam Convention have actually been banned in China. Since July 1st, 1997, importing or exporting pesticides in the Annex III was regulated by the General Administration of Customs (GAC), with the "Release Notice for Pesticide Import / Export" jointly issued by the MARA and the GAC.

1.2.3 Stockholm Convention

China signed the Stockholm Convention in May 2001 and ratified it in November 2004. The specific working group was organized by the MEE together with 14 additional coordinating authorities to examine regulatory issues and provide technical support for the Convention implementation. In April 2007, the State Council ratified the National Implementation Plan for

the Stockholm Convention, which focused on the action targets, measures, and facilitation activities. Under the framework of the National Plan, the Convention implementation mechanism and approaches have been established. Since the Stockholm Convention was enforced in China, 17 persistent organic pollutants (POPs) including dichlorodiphenyltrichloroethane (DDT) have been banned, more than 50 000 tons of obsolete POPs have been disposed. All POPs pesticides have been banned.

1.2.4 Others

There are four bromide methyl products registered as pesticides in China, but they will be banned in line with the Montreal Protocol from December 31th, 2018. China adopted the Minamata Convention on Mercury in October 2013. Prohibition of mining new raw mercury was established in August 16th, 2017, and local authorities for land resources have ceased to issue new mercury exploration licenses and mining permits. All original mercury mining will be completely banned from August 16th, 2032, according to the convention.

China signed the Basel Convention in 1990 and ratified it in April 1996. In December 2017, the updated Catalog of Strictly Restricted Toxic Chemicals (2018) was issued by the MEE. To implement the Basel, Rotterdam, Stockholm and Minamata Conventions, 10 strictly restricted chemicals are listed in the catalog as well as their uses. Importing and exporting the listed chemicals are tightly controlled by the GAC, MEE and other relevant authorities (the Ministry of Agriculture of China, 2017g).

2 Registration and Re-evaluation of Pesticides

According to *the Regulation of Pesticide Administration*, pesticide producers and overseas enterprises importing pesticides to China should apply for pesticide registration. All pesticides used in agriculture, forestry, gardening, storehouse, household, dock, buildings, and other facilities should be registered by the MARA. Pesticide evaluation priorities have shifted from efficacy evaluation to risk management.

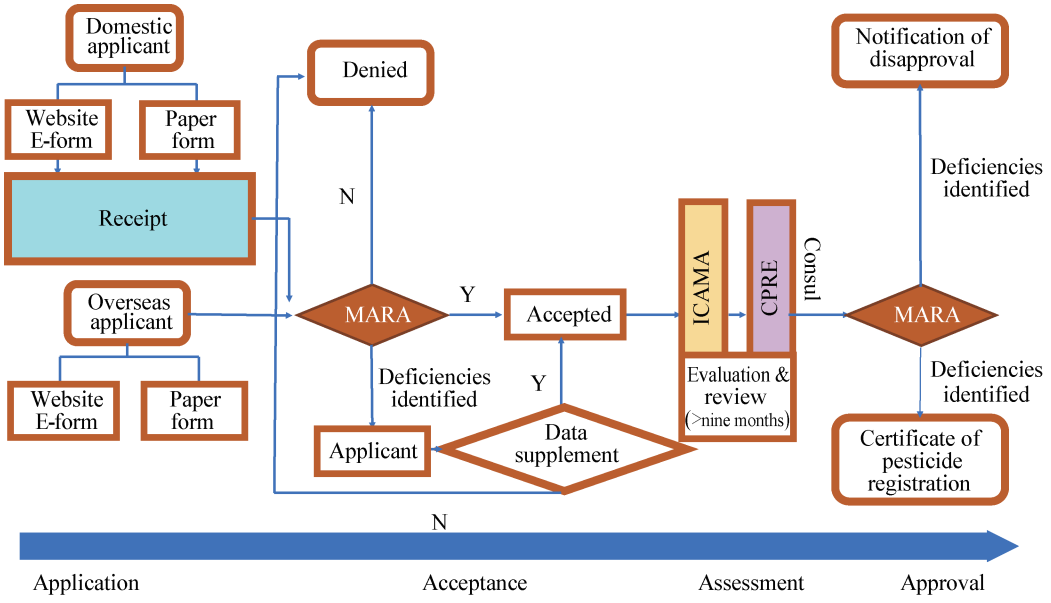
2.1 Evaluation, Reevaluation, and Approval Process

The Institute for Control of Agrochemicals (ICAMA), the subordinate institution of the MARA, is authorized by the MARA in pesticide evaluation, quality inspection, market supervision as well as the conventions implementation. ICAMA is comprised of 13 professional divisions, over 88 professional staffs and 31 provincial branches around the country.

For all pesticides containing registered active ingredients, the Field Trial Permits are canceled and granted by the Department of Agriculture in provincial governments and registered in the specific system. In China, the evaluation is conducted in a standard manner and decisions are made in a transparent way. There are three major steps in the registration process: 1) application and acceptance, where the applicant submits an application and relevant documents to the agricultural department of provincial governments, and then the applicant information and all the application documents are checked and accepted by the MARA; 2) evaluation and review, where the ICAMA initiates data evaluation and review, and provides its evaluation reports to the Committee of Pesticide Registration and Evaluation (CPRE); 3) approval, where the Registration Certificate is granted by the MARA according to the evaluation result provided by the CPRE (Fig. 1).

The pesticide registration certificate is valid for five years and can be renewed upon expiration. When the monitoring system at county level reports that pesticides crop damage or environmental pollution, etc occur in different areas or severe adverse impact causes unacceptable risk to human health or the environment, MARA would take emergency measures to mitigate the risk, and would conduct investigation or re-evaluation process further. Since 2013, 137 active ingredients and over 600 pesticide products have been re-evaluated and 38 active ingredients, including paraquat, fipronil, 2, 4-DB, flubendiamide, and chlorpyrifos, have been banned or restricted in use. Neonicotinoid pesticides, including imidacloprid and acetamiprid, are in re-evaluation process to determine the potential risk to pollinators (the Ministry of Agricul-

ture of China, 2017a).



This schematic drawing detailed a three-step registration process for pesticides: 1) domestic or overseas applicants submit data online and in paper form, 2) dossier will be evaluated and reviewed, and finally 3) the application will be approved/denied by the Committee of Pesticide Registration and Evaluation and the Ministry of Agriculture and Rural Affairs.

Fig. 1 Pesticide registration process

2.2 The Committee of Pesticide Registration and Evaluation (CPRE)

The CPRE fulfills a critical inter-agency consultation role mandated by the regulation and consults on health, environmental, policy, regulatory, and economic matters. In each session of the committee meeting, 43 committee members were selected from an expert group which was established by the MARA. The experts specialize in the fields of chemistry, efficacy, toxicology, residue, environment, production, quality standards, and testing methods concerning the pesticide products, and are recommended by the relevant academic institutions and authorizations including pesticide production, environmental protection, forestry, health, business and operations, crop production, and food safety. The committee meetings are organized by the MARA, normally twice per year depending on the number of new pesticides to be evaluated. In addition to a pesticide containing a new active ingredient, any old pesticides, new formulations, and new uses are evaluated by the Standing Committee of the CPRE every month. CPRE and Standing Committee normally evaluate 10−20 new active ingredients, about 4 000 products and uses per year (the Ministry of Agriculture of China, 2017a).

2.3 Data Requirement

A pesticide to be registered should meet the Data Requirement in China. Normally the dossier includes chemical analysis, toxicology, efficacy, metabolism, residue in food, environmental fate and impact, label, and other necessary data and information. MARA or CPRE may require applicators to submit additional data if the routinely required data are not sufficient for the evaluation of the potential risk caused by the pesticide. The compulsory study report should be provided by the MARA accredited laboratories, some data and study reports cited from other countries are conditionally accepted based on the official Data Acceptance Agreement. For me-too pesticide, data on residue and environmental impact are exempted only if the data submitted are corresponding to the identical data requirement through equivalent procedure (www. chinapesticide.org.cn).

MARA has published Test Guidelines that contain standards for conducting acceptable tests, guidance on the evaluation and reporting of data and suggested study protocols. Test Guidelines and study protocols could be obtained on the ICAMA website

(www.chinapesticide.org.cn). According to the latest Data Requirement, risk assessment is a necessary process for pesticide evaluation and re-evaluation. The updated information of data requirement and registered pesticides are available on the ICAMA website (www.chinapesticide.org.cn). The label and instructions should comply with the Rule of Pesticide Label, which conforms to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) guideline and was updated in 2017. Labels are written in Chinese and approved by the MARA (the Ministry of Agriculture of China, 2017g). The trade name has been canceled on the certification and label from 2007. The approved label information is accessed on the ICAMA website (www.chinapesticide.org.cn).

2.4 Cooperation and Harmonization

China has hosted 14 sessions of the Codex Committee on Pesticide Residues (CCPR) since 2007, and has collaborated with the U.S. Environmental Protection Agency (EPA) and Organization for Economic Cooperation and Development (OECD) Working Group on the capacity building of Good Laboratory Practice and mutual data acceptance. As one of the evaluation group member, ICAMA participated the Global Joint Review since 2015, some new active ingredients have been evaluated and registered in the global harmonized initiatives. China also has signed the MOU to cooperate in pesticide management with Vietnam, Turkey, Canada, Pakistan, USA, Germany, Japan, etc.

3 Implementation and Enforcement

3.1 Implementation and Enforcement System

The *Regulation of Pesticide Administration* is enforced at national, provincial, and county levels. The MARA is in charge of pesticide supervision across the country. The agricultural departments of the regional governments above the county level are responsible for supervision and administration of pesticides within their respective regions (the State Council of China, 2017).

Under the Regulation, *Rule of Pesticide Production* regulates the production permit application, evaluation, issue, supervision, and other relevant administrative activities. The agricultural departments of provincial governments regulate production permit approvals and administration within their respective regions. A production permit is valid for five years. Application for a production permit renewal should be done approximately 90 days prior to the expiration date (the Ministry of Agriculture of China, 2017b).

The agriculture departments of the regional governments are responsible for licensing approval of pesticide sales within their regions. License for sales and designated operators of HHPs are regulated by the agricultural departments of the provincial governments. The Rule of Pesticide Sales and Operation License regulates the sales license application, evaluation, issue, supervision, and other relevant activities. Sales license is valid for five years. Application for sales license renewal should be done approximately 90 days prior to the expiry date (the Ministry of Agriculture of China, 2017c).

3.2 Pesticide Use

According to the *Regulation of Pesticide Administration*, the agriculture departments of the regional governments at the county level are responsible for providing professional plant protection service, training and guidance on rational use, personal safety protection, HHPs inspection and pesticide residue monitoring. Some pesticide wholesalers establish their own service organizations and provide pesticide products and professional service to meet the user demands.

The total amount of pesticide use has been declined from 350 thousand tons (in active ingredients) in 2010 to 260 thousand tons in 2021. With the Zero Growth approach, pesticide use declination is benefiting from the development of the precise pesticide spray equipment, highly efficient and safer pesticide products, lower risk alternative subsidies, professional pest control services, farmer training, and biological technology extension.

3.3 Pesticide Residue and Food Safety

The MARA conducts pesticides residue monitoring in fresh vegetable, fruit, tea, and other crops. To safely use pesticides and reduce pesticide risk, Guidelines on Pesticide Rational Uses are published as national standards of China. The guidelines include use

pattern, application rate, preharvest interval (PHI), number of treatments, and maximum residue limit (MRL), and are used as the GAP reference in crop production. As the national standards of residue monitoring, the maximum residue limits in food is updated annually. The standards revised in 2021 include 10 092 MRL of 564 pesticides in 376 commodity groups, which cover the commonly used pesticides and crops, as well as 331 pesticide residue analysis methods. Reference to the Codex, MRL are set on the dietary risk assessment with data from pesticide residue field trials, resident dietary intake data, pesticide toxicological data, and market monitoring data. Researchers performed pesticide checks on 40 000 samples of 150 types of fruit and vegetables in 1 470 different locations every year. The monitoring rate of major crops including vegetables, fruit, tea, rice, wheat, maize, and soybean reached to 97.8%.

3.4 Environmental Impact Monitoring

ICAMA have conducted the pesticide residue monitoring in soil, surface water, ground water and in non-target organisms such as bird, bees, earthworm, and natural enemy in the ecosystem since 2009. The monitoring sites are in Jilin, Guangxi, Hunan, and Jiangsu provinces, and approximately 70 commercially available pesticides are on the list. The residues of these commonly used pesticides, such as atrazine, ametryn, isoprocarb, acephate, pendimethalin, fipronil, epoxiconazole, acetochlor, butachlor, bifenthrin, chlorantraniliprole, cyhalothrin, chlopyrifo, and carbendazim, could be readily detected in the soil samples or surface water during the crop growing season. The side effects of imidacloprid, acetamiprid, thiamethoxam, and other neonicotinoid insecticides to pollinators (e.g., bees) have been inspected and monitored since 2013.

3.5 Market Monitoring

Market monitoring involves product quality inspection, label, advertisement, and other supervisory activities of pesticide business, which is conducted by the MARA and regional departments. Operation accounts and records should be maintained for at least two years. In 2020, the nationwide inspection was performed by the MARA, the qualified rate is 81.6%, detected 1 000 samples from vegetable, fruit, tea, rice, wheat, corn, cotton, and soybean. There were 184 samples (18.4% of the total samples) detected as false pesticides for bad quality, containing restricted use HHPs, unregistered, adulterated or otherwise non-compliant pesticides.

The franchise business is encouraged by the government, about 1 000 franchiser and 30 000 pesticide affiliated retailers are established nationwide. There are about 250 million farmers, and 300 million pesticide users in China, 61% of them rely on the retailer. Pesticide Quality Tracing System is established to carry out the regular market monitoring with digital codes printed on product labels. Illegal activities, such as unlicensed production and business operation, counterfeiting and sale of counterfeit products, are punished, illegal incomes confiscated, and licenses and certificates revoked. The main responsible individuals are placed on a government list and prohibited from practicing relevant business.

3.6 Pesticide Import and Export

Depending on the *Regulation of Pesticide Administration*, overseas enterprises dealing with pesticide business should establish distributing branches in China or they should designate Chinese agencies acting on their behalf. Product label and instruction in Chinese are necessary for pesticides imported into China. Products should meet product quality criteria and pass inspections conducted by authorities. Pesticides without registration certificate will be denied entry into China by customs officials.

In 2018, 1.4 million tons of pesticides manufactured in China were exported to 170 countries and regions worldwide, in which herbicides were 990 thousand tons, insecticides 264 thousand tons, and fungicides 125 thousand tons. The exporting value reached 8.073 billion USD. Among them, technical products were 4.736 billion USD and accounted for 58.7%. To facilitate other countries to control pests and increase crop yields during the coronavirus pandemic, China issued announcement No. 269 in 2020 to increase the export of pesticides. The pesticide export values have increased sharply from 11.7 billion dollars in 2020 to 23.4 billion dollars in 2021.

3.7 Pesticide Waste Disposal

Pesticide users are encouraged by the government to properly dispose pesticide packages and other wastes by an incentive mechanism. Pesticide producers and pesticide business operators are responsible for recycling or disposal pesticide wastes under the Regulation of Pesticide Administration. The new Rules of Pesticide Package and Wastes Disposal were drafted by the MEE and MARA in 2017 to regulate the stakeholders' obligation and responsibility.

Fake and recalled pesticides are handed by the certified professional companies, who are qualified for disposal of hazardous and waste products, and the disposal fees ensuing are shared by pesticides producers and pesticides dealers. Disposal fees for pesticides from unknown sources of production and dealing are covered by expenditure plan from the budget of the local governments at county level. It is estimated about three billion pesticide packages are disposed every year, in which glass containers are 25%, PE/PET bags 30%, and plastic containers 45%. Agricultural waste collection and recycling are still a challenge for the local government in rural affair management.

3.8 Resistance Monitoring of Pesticides

The National Agriculture-Technical Extension and Service Centre (NATESC) is responsible for releasing the resistance monitoring report. The national resistance surveillance system was established in 1991 to track and manage pest resistance in some major crops. It has developed to compose of one expert group, two training centers, 80 monitoring pilots and over one hundred skillful staffs. Each monitoring pilot is facilitated with unified detection instruments and guidance. The monitoring system tracks the susceptibility changes in pests such as cotton bollworm, aphid, mite, rice stem borer, plant hopper, wheat aphid, and citrus mite, and has gradually expanded to weed, disease, and rodent resistance in recent years.

3.9 Laboratory Facilities

China has been improving laboratory capacities at national and local levels to improve food safety and product quality in recent 30 years. The MARA carry out laboratory accreditation on pesticide registration tests every five years. By March 2017, there were 314 laboratories designated to conduct pesticide registration tests, in which 17 laboratories on product composition and analysis test; 15 laboratories on physical/chemical properties test, 31 laboratories on toxicological test, 49 laboratories on residue test, 167 laboratories on bioassay, phytotoxicity, and efficacy test, and 35 laboratories on environment fate and impact test. The General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) is in charge of laboratory accreditation and supervision on products quality analysis test under QA standards.

4 Current Status of Pest Management

IPM is well developed and widely applied in China. By the end of 2017, pest control acreage with IPM and other biological technologies covers 37 million hectares, which is 27.2% to the total crop planting acreage, an increase of 7.2% compared to 2014. The strategy of pest control achieves to respect the natural resilience, reduce the chemical pesticides use and take IPM and other lower risk technologies as the alternatives, simplify and standardize the technology unit to be easily assembled, transferred, and adapted by local practices. Farmer and users make well-informed choices before purchasing a pesticide.

There are 102 biological pesticide active ingredients and 4 400 products registered in 2018. The production and consumption of biological products accounts for 8% and 10%, respectively of the total amount in 2017. To reduce pesticide use, from 2015, the whole process of green control was carried out in 150 counties, 600 demonstration farming areas were set for taking integrated control measures on IPM and professional pest control services, 24 demonstration zones were set for natural pollination and IPM control.

By 2017, 40 500 professional pest control service groups were recorded in governments; professional pest control services areas in main crop production regions (wheat, rice and corn) have covered 37.8%. The training programs have covered small farmers, farmer communities, and skilled persons providing pest control service.

The major measures to achieve pesticide use Zero Growth objective are to promote IPM based or

physical and biological based alternatives for pesticide use, train farmer program; use forecasting model in main crop production region, expand pilots and demonstrations areas on lower risk pesticides and precise spray pesticide techniques, use mechanical control, GPS and crop protection drones, use pesticide residue monitoring and GAP in high value crops production, and establish farmer communities and provide professional crop protection services.

5 Challenges in Pest and Pesticide Management

In China, pesticide use, as one of agricultural inputs, has been a great advantage for increasing crop production and food supply. On the other hand, pesticide industry and pesticide excessive use have brought side-effects to the environment, over-exploit natural resources, and increase risk to human health. The polluted river, soil, air, and ground water and food safety risk alert the government that pest and pesticide management should focus on sustainable development. To achieve the national strategy on Green Development and High-quality Development, the MARA has developed a five-year plan to promote agri-ecologically based methods and strengthen governmental administration to conduct risk management. There are some major challenges in pest and pesticide management oriented to green development strategy and high quality development strategy in China.

Firstly, it is very important to decrease the amount of pesticide manufacturers and production, to establish large-scale groups and nurture business groups through mergers, acquisitions and stock holding to improve the manufacturer's competitiveness. It is necessary to reduce the similar pesticide registration, encourage research and development by increasing the threshold in registration, policy support and investment in new pesticide with intellectual property. Secondly, it is necessary to control HHPs strictly, and to accelerate research and application of lower risk alternatives, gradually phase out the existing HHPs by 2022, limit the sales of HHPs in designated retailers or shops. Thirdly, it is very important to require the factories for technical ingredients products move to the chemical industry park to control industrial pollution and confirm the safe production. Fourthly, it is very necessary to realize pesticide "Zero Growth", by way of reducing chemical pesticide use, taking pest control measures on high efficient protection mechanical and technology, using lower risk alternatives, for instance, biological technology and IPM. Finally, it is very important to strengthen market supervision, to conduct pesticide quality inspection, establish a credit record system, and severely punish the violation activities.

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