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China: The problem of the overuse of pesticides

1. Definition

Pesticides are substances meant for attracting, seducing, and then destroying, or mitigating any pest. There is a class of biocide. The most common use of pesticides is as plant protection products (also known as crop protection products), which in general protect plants from damaging influences such as weeds, plant diseases or insects. This use of pesticides is so common that the term pesticide is often treated as synonymous with plant protection product, although it is in fact a broader term, as pesticides are also used for non-agricultural purposes. The term pesticide includes all of the following: herbicide, insecticide, insect growth regulator, nematocide, termiticide, molluscicide, piscicide, avicide, rodenticide, predacide, bactericide, insect repellent, animal repellent, antimicrobial, fungicide, disinfectant (antimicrobial), and sanitizer.

2. The background

According to statistics, thousands of kinds of pesticides are produced and used in China at present. China's crops by using the chemical pesticides, undo the damage for about 7% of the total output each year. According to the total grain output, which is 607.09 billion kg in 2014, 424.96 billion kg of it is contributed by the pesticides. China is an agricultural country with a large population. Cultivated land area of 1820 thousand square kilometer, but lack of cultivated land per capita is less than 900 square meter. Therefore, pesticide is an important and indispensable part of the Chinese agricultural production.

In 2014, the cumulative production of pesticides in China is 3.744 million tons, which rose by 1.4% in the last year. But 80% of pesticides directly go into the environment. Pesticides are used in the field that is over 18.6 million km² every year. Because of the overuse of pesticides, the number of the natural enemies of the pest or other beneficial insects rapidly reduced, causing a vicious cycle because of the additional use of the pesticide. In recent years, with the growth of the pesticides' quantity and the time that pesticides are used, the duration that pesticides remain increased; residual area gradually expanded; and the solid pollution appeared.

3. Types

Pesticides can be divided into highly toxic pesticides, moderately toxic pesticides and low toxicity pesticides.

(1). highly toxic pesticides

There are about 30 types of highly toxic pesticides as methamidophos, demeton

,Chlorfenvinphos,omethoate,monocrotophos,aluminum phosphide, carbofuran, chlordimeform (chlordimeform has ceased production)

(2). moderately toxic pesticides

Aetna methiocarb, Aetna bromadiolone Granville, fenitrothion, dimethoate, phenthoate, ethyl parathion, leafhoppers scattered, metolcarb, mixed off Granville, pirimicarb, fenthion, pyrethroids and so on.

(3). low toxicity pesticides

Marathon, acephate, phoxim, dicofol, carbendazim, thiophanate, captan, zineb, Iprobenfos, fosetyl aluminum, chlorothalonil, varieties nitrofen, propanil, Benthocarb, MCPA, glyphosate and so on.

4. Defining Typical Household

Citing a typical country household in Baoding, Hebei Province as an example, the husband has been working in the city as a migrant worker for six years and can only go back home once a year. The wife has lived in the husband's house with his parents since getting married. She should not only take care of her husband's parents but also a 7-year-old girl and a 9-year-old boy who studies in the local school.

This family got 0.2 km² field. And they mainly grow corn for sale and also grow some vegetables and fruits to meet the demands of their own family. The farm works are mainly done by the wife because of the husband's outside employment.

The family can earn about 2000RMB per month mainly from the husband. They can net earn about 1000RMB per year from the crops that they grow. There won't be much money left after spending on the daily life, the old and the children.

The wife only has the junior high school degree and doesn't know much about when and how the pesticides should be used. She learns such knowledge just from the old in the village and her experience of farming. She hardly ever read the specification of the pesticides and some of the pesticides they bought even don't have one.

The fields and the crops are impaired a lot because of the overuse of the pesticides. The wife believes that to increase the concentration of the pesticides while modulating can heighten the impact of the pesticides. But the truth is not. The effect of this behavior is that it will do harm to the crops and the soil. Although they choose the high-class seed every year. The output of the corn doesn't increase.

This is a typical family on the North China Plain. It can be easily found that the low quality of farmers and the backward agricultural fundamental installation construction lead to the overuse of the pesticides and restrict the development of the agriculture. A good solution is really needed and plays an important role in this problem.

5. The cause of the excessive use of pesticides.

5.1 China is backward in technique, and the quality of pesticide production still has lots of problems.

The pesticide is of a poor quality. It is mainly manifested in the following three aspects: First, 20% ~30% of pesticides in domestic markets are still unqualified. And 8% of the pesticide are of inferior quality. Second, the phenomenon of selling expired or losing efficacy pesticides happens frequently. Third, there are still a few pesticides which have no registration certificate on the market.

Quality problem is the core reason

which let the world pesticide industry transform to high technology. But in general, compared with the developed countries, the quality of the pesticide industry in China still has a large gap.

Especially in

some industrial backward old varieties, including technical and formulation, the gap is even greater.

5.2 The farmers' quality is low, and agricultural infrastructure construction needs to be improved.

In rural China, the population is large. The labour force is large, however, the overall cultural quality is low. Illiteracy accounts for a considerable proportion in nine hundred million farmers. Illiteracy and semiliterate people account for 80% of the poor in some area. With statistics, in eastern China, central and western underdeveloped areas, per capita education duration is of 6.71 years, 6.24 years and 4.31 years.

5.3 Pesticide regulation problems

There are too many government departments, and the coordination between each other isn't enough. Pesticide is a kind of special commodity, involving various government departments. Each department has their own respective functions, so they manage the production and management of the pesticide together. But due to lack of coordination between departments, a lot of questions appeared.

The laws need to be improved. With the emergence of new pesticide management problems, the current pesticide management regulations and system need to be further improved.

5.4 The sales link still exists a problem.

The pesticide lags behind developed countries in selling strategy and technology. Some pesticide sellers lack the investigation into their products. These people are short of professional knowledge and service skills. Their products are out of instruction manual, and the record of high toxic pesticides are hard to find.

6. Detriment

6.1 Crops

Nitrate, nitrite, nitrosamines, heavy metals of the pesticides can gather in the agricultural products. A large number of accumulation and residue can make the pesticide enrich, in the animal and

plants. The overuse of the pesticide leads to the reducing of the agricultural products quality and safety. In China, the increasing of pesticide pollution results in excessive pesticide in agricultural products and makes the international competitiveness of agricultural products drop greatly. As for apple, the apple output of China is the highest in the world. But at present Chinese apple exports account for only about 1% of the total production. The main reason for the obstacle of export is the excessive pesticide residues. The ratio of Chinese high quality orange is around 3%, while the ratio in the United States, Brazil and other countries with citrus is above 90%. The reason is that pesticide residues in the China's orange.

6.2 The ecological environment

6.2.1 The air pollution

The air pollution in the atmosphere causing by pesticide pollution mainly comes from the exhaust fumes of pesticide plant, spraying pesticides diffusing in the air and volatilization of pesticide residue. The exhaust fumes of pesticide plant for the worst. Residues of pesticides can spread following movement of the atmosphere. That's why the pollution scope expands unceasingly. Some even can drift to some places far away. Related to media reports, in the north and south poles and the Himalayas on the Tibetan plateau where have never been used pesticide have detected a trace of pesticide residues in the local environmental medium and environmental biology.

6.2.2 Water pollution

The main causes of water body pollution are pesticides production, processing enterprises of wastewater discharge and water spray, applying in the fields of pesticide with rain or irrigation water migration, drift and settlement of the atmospheric residues of pesticides and during the use of pesticides, and cleaning tools and instruments, etc. The loss of the farmland pesticide is the major source. According to the assessment of 109, 700 km river in China in 1998, 70.6% of the river is polluted by pesticide.

6.2.3 Soil pollution

The unscientific and non-standard use result in the fact that nearly 70% ~ 80% of pesticides directly permeate into the soil and surface water which destruct the soil ecology, make all kinds of harmful substances accumulate in the soil, and even change the ph of the soil, the balance carbon and nitrogen. And they go into the food chain through the crops which threaten human health.

6.2.4 Biodiversity

Some pesticides such as DDT absorption in the environment are absorbed by plants or animals and transfer through the food chain from junior to senior causing the accumulation and enrichment of pesticides. Human or other institutions of higher animals as part of the pyramid tip suffered a lot because of high concentration of pesticides. Pesticide pollution of soil does directly harm to

the organisms in the soil. Some land animals often die due to the biological enrichment poisoning, for example, owls, woodpeckers and many beneficial birds.

6.3. People

6.3.1 Occupational pesticide contacts

Due to the wide use of organ chlorine, organophosphate and carbonate pesticides in the production which belong to nerve conduction inhibitors, pesticide contiguity will affect the human's nervous system. After long-term exposure to paddy fields with pesticides such as pesticide herbicide, the number of agricultural laborers who have emergent diseases of nervous system such as sudden mental derangement increases. Central nervous inhibitor pesticide can result in neurobehavioral disorders, such as anxiety, depression, mania, etc.

Deposition, penetration and absorption of the pesticides in the skin are the main way of the process of pesticide exposure. Pesticides are not only absorbed through the skin into the body, but also directly affect the skin, which can cause irritation or allergic skin.

After investigation, it is confirmed that the use of pesticides also have correlation with cancer.

6.3.2 The consumer

Pesticide residue does harm to human. Residual of pesticide refers to residual pesticide compounds and their derivatives on the surface of animals, plants and other organisms. The quantity of them marks the pollution level. The pesticides in the environment can be directly remained in crops and some of them gradually proliferate from plants and animals to the food. They are absorbed by the human body at last which influence the health. Part of the spraying pesticide on the plant is absorbed by plants. Some evaporate and most of them go into the soil. The pesticide remained in the soil can still be absorbed by the roots into the plants' body, causing the pesticide residues. Feeding livestock and poultry with crops, forage, feed containing the residues of pesticides will cause that pesticides residue in their body and accumulate in fat, which makes eggs, milk, meat and other livestock and poultry products contains residues of pesticides. Pesticide residue goes through the food chain from low level to high level, gradually gathers and enriches. Residues of pesticides in plants and animal food finally concentrate at the top of the food chain: human, and make people suffer. Long-term heavy use of chemical pesticides can directly or indirectly threaten human health.

7.Measures

7.1. Perfect management system of pesticide and clear the functions of the government.

Build up the legal system about the pesticide, especially the law about how to pretend the pesticide pollution. Revise the Pesticide Management Regulations. Strengthen supervision, formulate and issue pesticide the regulations and measures of environmental safety.

7.2. Develop the bio-pesticide

Bio-pesticide are typically created by growing and concentrating naturally occurring organisms and their metabolites include bacteria and other microbes, fungi, nematodes, proteins, etc. They are often considered to be important components of integrated pest management programmed, Bio-pesticide, having many advantages over the traditional chemical pesticide especially in environmental compatibility and safety is considered as a powerful alternative to the use of it. It has many advantages:

- a. No harmful residues detected
- b. Can be cheaper than chemical pesticides when locally produced.
- c. Can be more effective than chemical pesticides in the long-term
- d. Biodegradable

7.3 Step up publicity efforts progressively

Enlarge publicity channel, use video, TV, newspaper enlarge propagandize the pesticide in intensive and various ways. Let people improve the awareness about environment protection. Let people raise awareness of environmental protection. Enhance the promotion of pesticide laws and regulations. Improve the consciousness of the rule and law in public. Strengthen the Pesticide Management Regulations and relevant legal publicity. Make people fully understand the importance and seriousness of pesticides in the process of production, circulation and use. Enhance the pesticide producer's and operator's awareness of the importance of legal system and make the good faith management. Let the broad masses of users use pesticide scientifically and standardized, in accordance with the law.

7.4 Strengthen the education and improve the peasant diathesis. Perfect the construction of agricultural infrastructure

Strengthen the basic education and agricultural knowledge education of farmers. Raise farmers' cognition of pesticide use. Government units should dispatch specialists to guide farmers choosing and using the pesticides in order to solve the problem of excessive use of pesticide from source.

7.5 Draw lessons from foreign experience

The United States and the European Union's Plant Protection Laws are stricter in the management of the use of pesticides. Pesticide users must have qualification certificates. Qualification certificate of paid services are generally divided into commercial medical qualification certificate, personal non-commercial use people's qualification certificate, pest prevention and control of building use personal qualifications and pest prevention and control of building company qualification certificate these four classes.

China can use the experience for reference and reinforce the management of the pesticides during producing, selling and using. Make sure the pesticides are used in a scientific method.