Jilin Province & World Bank Project of Agricultural Products Quality and Safety

Pest Management Plan

Jilin Province Agricultural Produce Quality and Safety Project of The World Bank Loan Leaders’ Group Office
July 1st, 2009
Table of Contents

Summary of recommendations ........................................................................................................1

1. background ................................................................................................................................. 2

1.1 OBJECTIVE ............................................................................................................................ 2

1.2 PEST PROBLEMS IN JILIN PROVINCE ................................................................................. 2

1.3 PESTICIDE APPLICATION IN JILIN PROVINCE .................................................................. 5

1.4 PEST MANAGEMENT ISSUES ................................................................................................. 6

1.5 CHINA PESTICIDE REGULATORY POLICIES FRAMEWORK/POLICIES .................................. 6

1.6 ADMINISTRATIVE ORGANIZATIONS FOR PESTICIDE SALES AND APPLICATION ................ 8

1.7 CURRENT PESTICIDE CONTROL METHOD IN THE PROJECT AREA ........................................ 9

1.7.1 Cultivate and use disease and insect resistant breed ......................................................... 9

1.7.2 Agricultural and physical prevention and control method ................................................ 9

1.7.3 Biological prevention and control method ....................................................................... 9

1.7.4 Chemical prevention and control method ....................................................................... 10

1.8 CURRENT SITUATION OF DISEASE AND PEST COMPREHENSIVE CONTROL .................. 10

2. pests management plan ........................................................................................................... 11

2.1 OBJECTIVES .......................................................................................................................... 11

2.2 PEST MANAGEMENT ACTIVITIES ....................................................................................... 12

2.2.1 Integrated control measures against major crop pests ....................................................... 12

2.3 INTEGRATED PEST MANAGEMENT（IPM）MEASURES FOR MAIN CROPS IN JILIN PROVINCE .... 14

2.3.1 Rice ................................................................................................................................... 14

2.3.2 Corn................................................................................................................................. 15

2.3.3 Soybean .......................................................................................................................... 17

2.3.4 Field vegetable ................................................................................................................ 18

2.3.5 Greenhouse vegetable .................................................................................................... 20

2.3.6 Apple pear ....................................................................................................................... 23

2.4 PROPOSED PROCUREMENT PESTICIDES FOR THE PROJECT ........................................... 25

2.5 PROJECT PROPOSAL TO PURCHASE THE NUMBER OF PESTICIDE VARIETIES .............. 27

2.6 THE ABILITY FOR TREATING PRODUCTS IN THE ACCEPTABLE RISK RANGE OF FINAL USERS ... 28

3. Implementation of pest management plan .................................................................................. 28

3.1 ORGANIZATION SETTING AND RESPONSIBILITIES ........................................................... 28

3.2 ABILITY CONSTRUCTION ..................................................................................................... 29

3.2.1 Training .......................................................................................................................... 29

3.2.2 Policy issue .................................................................................................................... 30

3.2.3 Infrastructure, ability, organization arrangement and cooperation ..................................... 30

3.2.4 Training and human resource development .................................................................... 31

3.2.5 Training of farmers ....................................................................................................... 31

3.3 MONITORING ASSESSMENT ................................................................................................. 32

3.3.1 Activities that need monitoring in implementation process ............................................. 32

3.3.2 Proposed monitoring indexes .......................................................................................... 32

3.3.3 Monitoring and Supervision ............................................................................................ 34
3.3.4 Arrangement of implementing pest plan progress report .......................................................... 34
4. Estimate of fund .......................................................................................................................... 34

ANNEX: ........................................................................................................................................ 1
A Mitigation .................................................................................................................................. 2
B Monitoring ................................................................................................................................. 4
C Institutional Strengthening and Training for Implementation ............................................... 6
D Scheduling and Reporting ....................................................................................................... 8

Attachment 1 List of forbidden pesticides in China ........................................................................ 1
Attachment 2 List of forbidden pesticides in China ........................................................................ 2
Attachment 3 Technical regulations for production of non public hazard vegetable in Jilin Province .... 3
1 SCOPE ....................................................................................................................................... 3
2 STANDARDIZED APPLICABLE DOCUMENTS ........................................................................... 3
3 DEFINITION ............................................................................................................................... 3
4 REQUIREMENT OF PRODUCTION BASE ENVIRONMENT .................................................... 3
5 PLANTING TECHNOLOGY ......................................................................................................... 4
6 PESTICIDE CONTROL TECHNOLOGY .................................................................................... 4
7 FERTILIZER APPLICATION TECHNOLOGY ............................................................................ 6
8 REQUIREMENT OF HARVESTING ............................................................................................. 6
Attachment Table 1 Chemical pesticides not allowed using in production of non public hazard vegetables
Attachment Table 2 Standard of reasonable application of non public hazard vegetable
Attachment Table 3 Suggested fertilizer type of non public hazard vegetable
Attachment Table 4 Using standard of nitrogen fertilizer limit in producing vegetable
Summary of Recommendations

The development objective of Jilin Province Agricultural Produce Quality and Safety Project introduces good agricultural practices and improves the implementation of agricultural product regulation and monitoring in order to reduce agricultural product safety risks and improve agricultural product quality in Jilin Province. Subcomponent A.2 of this project involves pest management. According to the World Bank “Pest Management” policy and in consideration of the actual agriculture production situation in Jilin province, the borrower formulated the following Pest Management Plan (PMP).

This PMP will be used for the Subcomponent A.2- Demonstration Sites for Good Agricultural Practices, which supports the establishment of 200-300 demonstration sites on farmers’ fields. Provisions are made for different farm production types and locations in order to encourage the adoption of good agricultural practices that improve agricultural product safety and quality. This sub-component would provide demonstration site support such as, technical assistance, training, equipment purchase, document printing, and packaging materials. It promotes Integrated Pest Management (IPM) and focuses on the following recommendations:

- Promote IPM technology at the demonstration sites, including biological diversification monitoring, protection and use of natural enemy resources, and monitoring and forecast of agriculture pest levels.
- Introduce and promote biological and botanical pesticides to replace harmful chemical pesticides, and reduce the adverse impact on the environment.
- Introduce farmer training programs and participatory field schools to teach IPM skills
- Enhance practical skills of farmers at the demonstration sites, and train them to master IPM skill, through participatory farmer field schools etc.
- Train farmers at the demonstration sites in the handling, storage and use of pesticides, and increase their awareness of pesticide management and use regulations.
- Provide IPM training for Agricultural Technology Promotion Station (ATPS) technicians, pesticide distribution personnel, city and county PMOs, to increase IPM awareness.
- Closely coordinate with local quality supervision agencies, strengthen supervision of pesticide sale and use in demonstration areas, to ensure compliance with related World Bank requirements for this project (OP 4.09 and BP 4.01) and other international agreements and the regulations on pesticide use.
- Establish a provincial PMP supervision team, an IPM consulting team, and city and county PMOs. Each project city, county, township, and farmer association will assign a specific person to be in charge of PMP implementation.
1. Background

1.1 Objective

The development objective of this project would be to introduce good agricultural practices and improve the implementation of agricultural product regulation and monitoring in order to reduce agricultural product safety risks and improve agricultural product quality in Jilin Province.

1.2 Pest Problems in Jilin Province

Jilin Province is located in the hinterland of Northeast China, and the expansion area is 187,400 square kilometers, accounting for 2% of the area in China. Located in the north most area of temperate zone of China, close to sub Frigid Zone, has obvious temperate monsoon climate. The average temperature in most parts of the province is 5.1°C, and accumulated temperate $\geq 10^\circ C$ is 2400 $\sim$ 3000°C·d; the average sunshine duration per year is 2400 $\sim$ 2900 hours, and from May to September, the sunshine duration is 1000-1400; the average annual rainfall is 400 $\sim$ 950mm, the rainfall in spring accounts for 15%, and that in summer accounts for 65%. The soils in Jilin Province are mainly black soil, light chernozem, chernozem, alluvium and meadow soil, making up 52%, then is the brown soil, grey brown earth and Baijiang soil, which make up 18%. Frost-free period is 120-160 days, with features of simultaneousness of heat and rain, which is beneficial for the growth of crops. The initial frost season is in late September, and ending frost season is in late April and early May. The soil in the province is fertile, suitable for growing grain and crop, oil plants, sugar beet, tobacco, hemp, potato, ginseng, medicinal material, fruit and vegetable etc. crops. The total planting area is 5 million hectares. The agriculture features of the province are mixed crop and livestock and fowl production, with small area of irrigated farmland, and system of one crop per annual. The population of the province is 27 million, the grain owning amount per capita, commercialization rate of grain, grain exportation amount, and corn exportation amount possess the top place in China for many years consecutively. It is one of the biggest commodity grain production bases in China. Songliao Prairie in the province is important grain production base in China, and famous Corn Belt in the World.

According to the ecological climate features of Jilin Province, it can be divided into three areas: (1) Arid and semi-arid ecological zone, located in the west of Jilin, is alluvial plain covered by sand dune, including Baicheng City and Songyuan City. The west part of this area belongs to terrace in front of Greater Khingan Range, and the north and east belongs to Songnen Prairie, the south belongs to Liaohe Prairie, and the area is 47,000 square kilometers, making up 25% of the total area in the province. The altitude in the province is 110-160 meters, and relative discrepancy in elevation is about 20 meters. The topography in the west of the prairie is law and flat, with large amount of marsh and alkaline soil, and content of organic substance is below 1.5%, and annual rainfall is 300 $\sim$ 400mm. The climate
is dry, with much wind in spring. The major crop is corn, then rice, miscellaneous beans, miscellaneous grain, sunflower seed, peanut and soybean, etc. (2) Middle Songliao Prairie area, including Changchun, Siping, Liaoyuan area. The soils are mainly black soil and chernozem; middle production area ≥10°C active accumulated temperature is 2800~3000°C·d, and annual rainfall is 500-600mm. The water and heat condition in this area is good, topography is flat, soil is fertile, and is the major high-yield corn production area. The major crops are corn, rice, soybean, fruit tree, and vegetable, etc. (3) eastern mountainous area and semi-mountainous area, including Jilin, Tonghua, Baishan, and Yanbian area. The soils are mainly brown soil, grey brown earth, and Baijiang soil. The climate in eastern production area is humid and cold, ≥10°C active accumulated temperature is 2000~2700°C·d, and annual rainfall is 700-900mm. Frost-free period is only 100-120 days, and the major crops are corn, rice, fruit tree, vegetable and medicinal material, etc. (look at table 1).

Table 1: Major crops grown in different agriculture ecological belt of Jilin Province

<table>
<thead>
<tr>
<th>Agriculture ecological belt</th>
<th>Participating prefecture-level city</th>
<th>Major crops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western arid and semi-arid prairie area</td>
<td>Baicheng, Songyuan area</td>
<td>Corn, rice, soybean, sunflower seed, millet, castor-oil plant, sorghum, mung bean, peanut, vegetable, and Chinese medicinal material, etc.</td>
</tr>
<tr>
<td>Middle Songliao Prairie area</td>
<td>Changchun, Liaoyuan area</td>
<td>Corn, rice, soybean, fruit and vegetable etc.</td>
</tr>
<tr>
<td>Eastern mountainous and semi-mountainous area</td>
<td>Jilin, Tonghua, Baishan, and Yanbian area</td>
<td>Corn, rice, fruit, vegetable, ginseng, and Chinese medicinal material etc.</td>
</tr>
</tbody>
</table>

Crop planting area of Jilin Province is about 5 million hectares each year, among it, corn is about 3 million hectares, rice about 750,000 hectares, and soybean about 500,000 hectares. The total output of grain is 50 billion – 55 million jin. (Please look at table 2)

Table 2: Planting area and output of major crops

<table>
<thead>
<tr>
<th>Project</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2006</td>
<td>2007</td>
</tr>
<tr>
<td></td>
<td>Planting area (1,000 hectares)</td>
<td>Total output (10,000 tons)</td>
</tr>
<tr>
<td>Total planting area of crops</td>
<td>4984.60</td>
<td>5040.30</td>
</tr>
<tr>
<td>Total of grain</td>
<td>4325.50</td>
<td>2720.00</td>
</tr>
</tbody>
</table>
The major crops in Jilin Province are corn, rice, and bean etc., and important pest and plant diseases are maize stalk rot, maize head smut, corn borer, rice blast, hymexazol, bakanae disease of rice, Chilo suppressalis, soybean cyst nematode, soybean pod borer, and peanut root rot, etc. Besides, the project area also plants certain area of sunflower seed, castor-oil plant, and sorghum etc. crops. The major insect diseases are sunflower moth, plasmopara halstedii, orobanche Cumana, sunflower black leaf spot, castor-oil blight and sorghum kernel smut etc.

The type of farmland vegetable is many, and the occurrence condition of plant disease and insect pest is complicated, mainly soft rot, downy mildew, virus disease, epidemic disease, greensickness, septoria glycines, aphid, cabbageworm, diamond back moth, and red mite etc;

The project area also plants certain area of fruit trees and medicinal materials, etc. The major plant diseases and insect pests are black spot, brown spot and budworm etc;

The major weeds are echinochloa crusgalli, green bristle grass, digitaria sanguinalis, goosefoot, amaranth, polygonum, Xanthium japonicum willd, abutilon, and cephalanoplos segetum, etc.

The major bandicoots are cricetulus barabensis, mus musculus, apodemus agrarius, cricetus triton, citellus dauricus etc.

Table 3: Production Area and Major Crop Pest in Jilin Province

<table>
<thead>
<tr>
<th>Type of crop</th>
<th>Area (10,000 mu)</th>
<th>Major Crop Pests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>4500</td>
<td>grey speck disease, stem rot, head smut, corn borer, aphid and underground plant diseases and insect pests</td>
</tr>
</tbody>
</table>
1.3 Pesticide Application in Jilin Province

The application amount of pesticide in Jilin Province is 1.8-2.0 (10,000tons) (commodity grain), among it, herbicide makes up about 65%, pesticide makes up about 20%, and antiseptic makes up about 15%.

The pesticide application kind and possibility of all kinds of crops are shown in table 4. The application amount of greenhouse vegetable is the largest, amounting to 11 kilograms per hectare, then is rice, corn, fruit trees and continent vegetables, about 5 kilograms per hectare. The application amount of soybean and peanut is the least, about 5 kilograms per hectare.

Table 4: Pesticide application kind and possibility of all kinds of crop pesticide

<table>
<thead>
<tr>
<th>Crop</th>
<th>Kind and application possibility</th>
<th>Amount(kilogram/hectare)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Insecticides</td>
<td>Fungicides</td>
</tr>
<tr>
<td>Rice</td>
<td>90%</td>
<td>80%</td>
</tr>
<tr>
<td>Corn</td>
<td>50%</td>
<td>80%</td>
</tr>
<tr>
<td>Soybean</td>
<td>20%</td>
<td>80%</td>
</tr>
<tr>
<td>Peanut</td>
<td>20%</td>
<td>100%</td>
</tr>
<tr>
<td>Continent vegetable</td>
<td>90%</td>
<td>100%</td>
</tr>
<tr>
<td>(1 season)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greenhouse vegetable</td>
<td>80%</td>
<td>100%</td>
</tr>
<tr>
<td>(1 year)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit tree(apple pear)</td>
<td>30%</td>
<td>60%</td>
</tr>
</tbody>
</table>
1.4 Pest Management Issues

Pesticide is a kind of important means of production, and it plays a very important role in enhancing output and quality of agricultural produce. But unreasonable use of pesticide also easily causes some potential harm, such as poisoning of people and livestock, killing and damaging natural enemy, and polluting agricultural produce and environment etc. The management of plant disease, insect pest and weed mainly exists the following problems:
● Not pay attention to the impact of pesticide on ecological environment. In the process of applying pesticide, the pesticide residual exists in the environment, which causes harm to the ecological environment through all kinds of means. The most important ones are the drug resistance of pest to pesticide, as well as pesticide residual. To be specific: 1. Mainly depend on chemical prevention and control method, using pesticide in too much amount. 2. Use one kind of pesticide for a long time.
● Unreasonable application of pesticide, and improper technical operation. During pesticide application period, the application time, application amount, and application method are not proper, which cannot ensure the pesticide effect, but also pollutes the environment. 100 percent peasant household use herbicide, and the application amount of most peasant households is higher than the application amount of recommended herbicide, which often causes harm in that immediate year and the following planted crops. Moreover, the impact of herbicide on soil and underground water is often unknown. Most peasant households cannot master the application period, application amount and application method of pesticide(e.g. Atrazine).
● Using high poison pesticide. According to the pesticide application regulations of China, high-poison pesticide is prohibited to be used in vegetable, tealeaf, fruit trees and Chinese medicinal material. But table 2 shows that the regulations of pesticide application and the actual production need of peasant household exist certain gap, and there is no high-poison pesticide alternative.
● Pharmaceutical machinery quality has certain problems, such as material quality, tightness, sprinkle-nozzle, spray quality etc. don’t reach standard, which affects medicinal effect and pollutes the environment.
● Unreasonably keep pesticide and other agricultural chemicals; improper treatment of pesticide wastes and packages;
● Not much focus on anti-disease breed and biological prevention and control technology; not advantageous promotion for agriculture prevention and control measures; not enough comprehensive prevention measures
● The understanding degree of peasant households, promotion personnel and pesticide dealers is relatively low, especially lack of IPM knowledge of farmers;
● Not strong awareness for safe application of pesticide.

1.5 China Pesticide Regulatory Policies Framework/Policies

Mainly including:
● "Administrative Regulations of the People's Republic of China on Pesticides" (issued by the State Council, took force on May 8th, 1997, and amended on November 29th, 2001); the
Ordinance is to strengthen the pesticide production, management and use of the supervision and management to ensure the quality of pesticides, protection of agriculture, forestry production and ecological environment, safeguard human and animal safety.

- "Measures for the Implementation of Pesticide Administrative Regulations" (issued by the Ministry of Agriculture on April 27th, 1999, and amended on January 8th, 2008) the implementation is to ensure that "Pesticide Management Ordinance" (hereinafter referred to as "Ordinance") the implementation and strengthening of pesticide registration, management and use of supervision and management of pesticide industry to promote technological progress, and ensure the stable development of agricultural production, protect the ecological environment, safeguard human and animal safety, in accordance with "regulations" the relevant provisions.

- "Measures for Administration of Non Public Hazard Agricultural Produce" issued by the Ministry of Agriculture and General Administration of Quality Supervision, Inspection and Quarantine "in 2002; the management approach is to strengthen the management of pollution-free agricultural products, and safeguarding the interests of consumers, improve the quality of agricultural products, the protection of agricultural ecological environment, promoting sustainable agricultural development.

- "Regulations on Safe Use of Pesticide" issued by the Ministry of Agriculture, Animal Husbandry, and Fishery and the Ministry of Public Health issued in May, 1982; the provisions of the main toxicity of the pesticide by size classification, and provides for the use of different pesticides the scope of the purchase of pesticides, transport and storage and the use of pesticides in the note.

- "Provisions on the Administration of Restricted Use of Pesticides" issued by the Ministry of Agriculture on August 1st, 2002; the provision restricting the use of pesticides in order to do a good job in management, according to "Pesticide Management Ordinance" enacted.

- Standards for Safety Application of Pesticides GB4285-84;
- Guideline for Safety Application of Pesticides (I) GB/T8321.1;
- Guideline for Safety Application of Pesticides (II) GB / T 8321.2;
- Guideline for Safety Application of Pesticides (III) GB / T 8321.3;
- Guideline for Safety Application of Pesticides (IV) GB / T 8321.4;
- Guideline for Safety Application of Pesticides (V) GB / T 8321.5;
- Guideline for Safety Application of Pesticides (VI) GB / T 8321.6;
- Guideline for Safety Application of Pesticides (VII) GB / T 8321.7;

The main criteria for the above criteria and for different crops in different application amount of pesticides, application number, security interval, maximum residue limits, application of the provisions of note.

These standards and guidelines for good in our country to establish a set of research, production, application, monitoring and management system. Especially in May 8, 1997 the State Council promulgated the "Regulations on the Management of pesticides" is China's first with the power management of the effectiveness of administrative rules and regulations of pesticides, which indicates that China has entered a pesticide management standardization, the rule of law and international track, also indicates that China has been formed pesticide
regulations. In January 2008, as amended, "Implementation of Pesticide Management Ordinance", of "pesticide regulations," the smooth implementation of security played a good role. China's pesticide management in the largest regulatory gap is detrimental to the farmers the proper use of safety awareness of the lack of pesticides, should strengthen the supervision and training, to meet the shortfall.

1.6 Administrative organizations for pesticide sales and application

Jilin Province Pesticide Testing Institute and Agriculture Law Enforcement Brigade of each city and county etc. are responsible for the supervision and administration work of pesticide production, operation and use, and the department or unit that operates pesticide should handle operation license according to related regulations of China. The departments or units that can operate pesticide include:

1. Agricultural means of production operation units of supply and marketing cooperative;
2. Plant protection station;
3. Soil and fertilizer station;
4. Agriculture and forestry technology promotion organizations;
5. Forest pest control organizations;
6. Pesticide production companies;
7. Other operating units regulated by the State Council.

The pesticide application and management units are mainly each level of agricultural technology promotion station, plant protection station in the province. Jilin Province Jilin Province Agricultural pesticide Calibration Institute is responsible for pesticide registration and the supervision and management of pesticides. Jilin Province Jilin Chemical Pesticide Management department is responsible for production planning, production supervision and management of pesticides, the specific pesticides responsible for the production of a permit issued by the production of approval documents. Jilin Technical Supervision and the industrial and commercial administration departments in accordance with national and local relevant laws and regulations on pesticide product quality, management, market supervision and management and so on. Project areas of pesticide use must be consistent with national standards, industry standards or enterprise standards. Pesticide packaging, transport and storage of pesticides to the use of essential post-production process. Pesticide packaging should comply with the State Bureau of Technical Supervision issued GB3796-85 "General packaging of pesticides", GB4838-84 "EC pesticide packaging", GB5736-85 "pesticides used corrugated boxes calcium plastic " three of the relevant provisions of national standards. Strict enforcement of pesticide transport "pesticide storage, sale and use of anti-virus point of order" provisions of the national standards. Storage shall be subject to "the provisions of the safe use of pesticides" in paragraph 3 of the overall requirements. Pesticide management in Jilin Province and other provinces, primarily in the negative regulation of the situation, farmers in many parts of the existence of the use of highly toxic pesticides, over-excessive use of pesticides, can not strictly comply with the national application of the provisions of such interval.
1.7 Current pesticide control method in the project area

1.7.1 Cultivate and use disease and insect resistant breed

Using disease and insect resistant breed, especially disease resistant breed is one of the most effective, economic and feasible measures. For many diseases and insects that are hard to control by using agricultural measures, and lack effective pesticides and other biological prevention preparations, such as soil-borne disease, virus disease, air-borne disease, selecting and cultivating disease-resistant breeds is especially important. V dahlia, rice blast, maize stalk rot, sphacelotheca reiliana, corn borer and soybean pod borer etc., can be solved through planting disease-resistant breeds, and thus it has the feature of safety.

Selection of disease-resistant breed: can apply and promote the breed and multilineal variety or mixed disease-resistant breed with horizontal resistance and durable resistance. Adopt multilineal variety with the same economical character and different disease-resistant genes, which can slow down the pathogenic bacteria minor species composition.

Reasonable breed layout: for the disease and pest in large area, adopt breed of different disease resistant genes in different disease and pest epidemic area, and use many disease resistant breeds with different genes in the same epidemic area in order to make disease resistant breed inheriting diversified, such as rice blast and corn big and small spot disease.

1.7.2 Agricultural and physical prevention and control method

The agricultural and physical methods used for preventing and controlling disease and pests are:

- Select healthy seed, seedlings and asexual reproduction materials.
- Reasonable rotation of crop.
- Sowing in proper period.
- Ploughing in proper time.
- Do well farmland hygiene.
- Strengthen water and fertile management.
- Remove egg and catch larva through manpower in the peak period of disease and pest occurrence period.
- Kill pests through induction.
- Cover fruits with bags.

1.7.3 Biological prevention and control method

At present, the biological prevention and control methods used in large area of production are:

- Prevent and control corn borer through releasing oophagous trichogrammae;
- Prevent and control corn borer through beauveria bassiana;
- Prevent and control cabbage worm through BT;
Prevent and control grub by using grub milky bacteria and beauveria bassiana number 4;

Prevent and control aphid and diamond back moth by using abamectin;

Prevent and control vegetable gray mold through trichoderma SP;

Prevent and control greenhouse red spider through predaceous mite etc. biological prevention measure, which can only be applied in small area.

The biological prevention and control methods used by farmers are: duck breeding in rice paddy, and by using duck breeding in rice paddy, the rice paddy disease and pest and weed harm can be controlled, and pesticide application is reduced.

1.7.4 Chemical prevention and control method

Chemical prevention and control method is the most economic and effective method for preventing and removing crop disease and pests. Chemical prevention and control has the unique features of quick effect, good prevention and control effect, and simple and convenient usage etc. However, there are also shortcomings, such as environmental pollution caused by improper treatment, which affects safety of people and livestock, and causes plant diseases. When chemical prevention and control method has to be used, we should try to adopt pesticide breed and application method with relatively small impact on people, livestock and the environment.

1.7.4.1 Prevention and control method of non-chemical compound pesticide

Prevent and control certain crop diseases and pests by using some non-chemical compound pesticide.

- Using dilute machine oil emulsion to prevent and control mites in fruit trees;
- Paint fruits tree trunks with lime in order to control disease and pest, spray CuSO₄ to prevent and control disease and pest of fruits trees;
- Using sugar and vinegar mixed liquor to catch pests of vegetables; can also be combined with light.

1.7.4.2 Prevention and control method by using chemical compound pesticide

- Use seed coated with a pesticide and antiseptic
- Soak, mix and stuffy seedlings by using pesticide and antiseptic
- Soil treatment
- Smog suffocating
- Direct plant spraying to prevent and control crops diseases and pests and weeds.

1.8 Current situation of disease and pest comprehensive control

The General Agricultural Technical Extension Center of Jilin Province and each county sub station is responsible for the extension work of comprehensive control method of plant diseases and pests, especially corn, soybean, rice and vegetable disease and pest (look at attachment 2). However, the number of technical staff of each level extension station and
plant protection station that can spend time in extending integrated pests management (IPM) technology locally and train the farmers about these methods is limited. At the county level, we cannot broadly gain the training textbook about plant disease and pest comprehensive control, and cannot carry on training to farmers effectively. At the township level, the activity fund of extension staff of the agriculture station is limited, which cannot support training of farmers by the extension personnel. At the same time, there is lack of motivation mechanism for promoting integrated pests management method at the county and township two levels. Thus, the activity for extending IPM is not high.

According to the above problems, the work that should be carried on includes:
- Carry on training to county and township level plant protection experts and extension personnel about integrated pests management and IPM advanced methods;
- Adopt practical operation method to carry on training according to the need of farmers;
- Compile IPM training textbooks and viewing and listening textbooks in local language and distribute them to farmers;
- Provide preferential support to the IPM application research of crops/pests;
- Formulate motivational mechanism for extending integrated pests management methods at the county and township two levels.

2. Pests Management Plan

2.1 Objectives

The goal of pests management plan of Jilin agricultural produce quality and safety project is to adopt integrated pests control method according to the major problems in pests and weeds prevention and control in the project demo base, adopt integrated pests control method, promote the standardization of integrated control of harmful organism in agriculture, reduce the chemical pesticide application amount in the project area by over 20%, and control the crop loss caused by pests and weeds below 10%.

The specific measures are as follows:
- Promote IPM technology at the demonstration sites, including biological diversification monitoring, protection and use of natural enemy resources, and monitoring and forecast of agriculture pest.
- Introduce and promote biological and botanical pesticides to replace harmful chemical pesticides, and reduce the adverse impact on the environment and the human.
- Enhance practice skill of farmers at the demonstration sties, and train them to master IPM skill, through participatory farmer field schools etc.
• Provide farmers at the demonstration sites with trainings of handling, storage and use of pesticides, and increase their awareness of regulations of pesticide management and use.

• Provide IPM trainings for technicians from Agricultural Technology Promotion Stations (ATPS), pesticide distribution personnel, city and county PMOs, to increase their IPM awareness.

• Closely coordinate with local Quality Supervision Agencies, strengthen supervision on sales and use of pesticide in demonstration area, to ensure these demonstration sites to comply with related requirements of the World Bank on this project (OP 4.09 and BP 4.01) and other international agreements and the regulations of pesticide use.

• Establish a provincial PMP supervision team and an IPM consulting team, city and county PMOs. Each project city, county, township, and farmer association will arrange specific person to charge the PMP implementation, thus ensuring effective PMP implementation.

2.2 Pest Management Activities

Pest management project of Jilin agricultural produce quality and safety will control pests according to specific crop by using agricultural, physical, biological and chemical prevention and control etc. integrated measures in order to reduce dependence on compound chemical pesticide.

2.2.1 Integrated control measures against major crop pests

Principle: at first, each level of unit should do well the forecast work of pests, and once there are pests, adopt agricultural prevention and control, then physical and biological prevention and at last, use chemical pesticide prevention and control method.

2.2.1.1 Strengthen disease and pest forecast work

Each city and county plant protection and inspection station should provide the disease and pest forecast, prevention and control information to farmers timely, about 7-10 days in advance, including subjects of prevention and control, proper period of prevention and control, prevention and control technology, and pesticide kind of prevention and control etc. And we carry on disease and pest prevention and control accordingly, which can enhance effect of prevention and control, and reduce application amount of pesticide.

2.2.1.2. Agriculture prevention and control

Demo base can practice adaptation to local conditions according to specific condition, and adopt the following agriculture prevention and control measures:

1. Select resistibility breed: select good resistibility breed is one of the most important measures for enhancing the resistibility of crops, and reducing chemical pesticide application.
2. Crop rotation: the purpose of crop rotation is to avoid the occurrence of pests due to many years’ continuous cropping.

3. Reasonable intercrop and under crop sowing: such as intercrop between corn and soybean can reduce the transfer of alatae.

4. Adjust sowing time: advance or postpone crop sowing time in order to make the crop infection time avoid peak time of pest occurrence, thus avoiding or reducing the occurrence of pests.

5. Farming measures: deep farming, bury the remnant stubble and weeds in soil and avoid multiplication of worms and eggs; after harvest of rice, practice immediate ploughed fallow to reduce the occurrence of rice borer.

6. Cultivate healthy and strong seedlings: do well seed and soil sterilization treatment, remove inferior seedlings, and cultivate strong seedlings.

7. Cultivation weed removing: cultivation weed removing can reduce the occurrence of disease and pest.

8. Practice deep turning cultivation, and high ridge planting: after harvest of drought crop, practice timely deep cultivation, about 26-33 cm, which can turn the surface disease and pest into soil, or expose the deep overwintering pests to the surface in order to suffocate them or freeze or burn them to death.

9. Reasonable fertilizer application and timely irrigation and drainage: apply enough base fertilizer, control application of nitrogenous fertilizer, limit application of phosphate fertilizer, and add application of potash fertilizer in order to strengthen the pest resistant ability of crops. Practice scientific moisture management, which can play good effect of preventing and controlling pests.

10. Clean the field: remove the leaves infected with pests, deadwood or ill and remnant plants in order to reduce the source of pests.

2.2.1.3 Physical prevention and control

1. Erect pest prevention net, which can be applied in vegetable and fruit tree planting, and can play the role of pest prevention, disease prevention, rain prevention, wind prevention, light covering and humidity preservation.

2. Killing through induction: use yellow mucilage glue board to kill whitefly, aphid etc. Kill moth, beetle, and orthoptera imago etc., kill moth using sweet-and-sour liquor.

2.2.1.4 Biological prevention and control

1. Using biological preparation, such as Bt emulsion, Liuyangmeycin, nucleopolyhedrosis virus, beauveria bassiana, chunleimeisu, and jinggangmycin etc.

2. Using natural enemies of pests, such as oophagous trichogrammae.

3. Apply sex induction to kill pests, such as Chilo suppressalis, diamond back moth and corn borer.

2.2.1.5 Chemical prevention and control

Combination of chemical prevention and control and other prevention and control measures is economic and effective measure for enhancing prevention and control efficiency and ensuring high yield of agriculture. It requires pesticide with high quality application, good
effect for pest prevention, no toxic or low toxic to people and animals, and safe to crops. The major chemical prevention and control measures include:

1. Strictly prohibit the use of rank poison, high poison, and high residual pesticide.
2. Use different kinds of pesticides for preventing and controlling different pesticides and weeds, and practice
3. Use pesticide at proper time according to the occurrence time of pests.
4. Use pesticide in proper amount.
5. Reasonably mix pesticide alternately.
6. Strictly implement safe harvest internal period.

2.3 Integrated Pest Management (IPM) Measures for Main Crops in Jilin Province

2.3.1 Rice

2.3.1.1 Major pests and weeds: bakanae disease, drooping disease, rice blast, Chilo suppressalis, rice grasshopper, weeds in rice paddy

2.3.1.2 Goal of prevention and control

The prevention and control efficiency of crop bakanae disease, reducing diseases over 90%; the prevention and control efficiency of rice blast is over 75%; the prevention and control efficiency of Chilo suppressalis, and rice grasshopper etc. pests is over 90%; the prevention and control efficiency of rice paddy weed is over 90%.

- The loss of output caused by pest should be controlled below 5%;
- The application amount of chemical pesticide should be reduced by at least 25%, and the application time of each crop growth season should be controlled between 2-2.5 times;
- Forbid production pesticide poisoning accident;
- Ensure safe storage of pesticide and safe treatment of wastes;
- Increase the number of natural enemy of rice paddy pests. (such as spider, frog etc.)

2.3.1.3 Measures of integrated control:

2.3.1.3.1 Pest forecast: the major tasks of county plant protection station are enhancing forecast level of crop pests occurrence and breakout, and 7-10 days before pest occurrence, tell farmers at what time, use what methods to prevent crop pest, and in one crop growth season, at least provide three times pest prevention and control information to farmers.

2.3.1.3.2 Breed selection: reasonably select crop breed suitable to local conditions, with high quality, high yield and strong disease resistant property, especially breeds with strong disease resistance ability against rice blast and bakanae disease. For information about specific breed, consult local plant protection station and seed management department.

2.3.1.3.3 Field management

2.3.1.3.3.1 After harvest in autumn, deep till the rice paddy. Rice straw should be treated centrally, and should not be piled or scattered in field. Reasonably apply fertilizer, such as potash fertilizer and phosphate fertilizer, which can enhance the disease resistant ability of plants, and applying too much phosphate fertilizer or applying too late will aggravate disease.

2.3.1.3.2 Crop send should be soaked in prochloraz to prevent and control bakanae disease, and use 25% prochloraz emulsifiable concentrate 3000~5000 times liquid to soak seeds for
5-7 days. Adjust acidity of seedlings, and seedbed can choose 95% dexon soluble powder 2.75kg/hm² or 30% tachigaren 3~6ml/m², add water and irrigate it and sterilize. In the initial occurrence period of drooping disease, choose 95% dexon soluble powder 2.75kg/hm² or 30% tachigaren 3~6ml/m², add water and spray it.

2.3.1.3.3 10-15 days before transplanting seedlings, let seedlings in fresh air, and when transplanting, remove weak seedlings.

2.3.1.3.3.4 According to the weed occurrence condition of rice paddy in Jilin Province, carry on chemical weed control, and 10~15 days after adopting crop transplanting, adopt 96% Ordram+ 10% Londax: 170~200 + 13~17 ml (gram)/mu.

2.3.1.3.3.5 According to pest occurrence condition, prevent and control chilo suppressalis in middle June an early July, can use Bt emulsion, use 10 billion spore/gram, smut 750 gram/hectare.

2.3.1.3.3.6 Deep irrigation snout moth's larva extermination: in egg stage of chilo suppressalis, discharge water under 3cm deep water, after egg peak stage or in end of egg stage, irrigate deep water one time respectively, and water depth of 12-15cm. Cover the vagina and maintain it for three days; before pupa, discharge water to 3cm, after pupa stage, irrigate deep water of 12-15cm, maintain it for three days.

2.3.1.3.3.7 Use 2% chunleimeisu wettable powder1200～1500gram/heactare to timely prevent and control rice blast.

2.3.1.3.3.8 Cut the rice in dirt when harvesting crop.

2.3.1.3.3.9 30 days before harvesting crop, forbid using chemical pesticide to prevent and control pests.

2.3.2 Corn

2.3.2.1 Major pests of corn: head smut, stem rot, corn borer, apophylia flavovirens, black cutworm etc.; corn secondary pests: northern corn leaf spot, grey speck disease, mole cricket, grub, wire worm, and aphid etc. ten kinds. In certain years, these secondary pests can also become disaster in certain places.

2.3.2.3 Goal of pest management: adopt integrated prevention and control measures, control pest and weed, and gradually reduce application amount of pesticide within 3-5 years. The specific goal is:

· prevention and control efficiency of corn head smut is over 90%; prevention and control efficiency of corn stem rot is over 70%; prevention and control efficiency of corn underground pests is over 85%; prevention and control efficiency of corn borer is over 75%; and prevention and control efficiency of cornfield weed is over 90%.

· loss caused by pest and weed is below 5%.

· Application time in the whole year reduces by 25%, and consumption amount of chemical pesticide reduces by over 20%;

· Increase of the number of natural enemies of pests, that is, 100 seedlings have over 50 natural enemies;

· Ensure reasonable use of pesticide;
·Safety treat pesticide package and wastes.

2.3.2.4 Integrated control measures:

2.3.2.4.1 Forecast of pest: the major tasks of county plant protection station are enhancing forecast level of corn pests occurrence and breakout, and 7-10 days before pest occurrence, tell farmers at what time, use what methods to prevent corn pest, and in one corn growth season, at least provide three times pest prevention and control information to farmers.

2.3.2.4.2 Breed selection: reasonably select corn breed suitable to local conditions, with high quality, high yield and strong disease resistant property, especially breeds with strong disease resistance ability against corn head smut, stem rot and corn borer. For information about specific breed, consult local plant protection station and seed management department.

2.3.2.4.3 Field management

2.3.2.4.3.1 After harvest in autumn, burn stumps and redundant straws, and deep till the farmland. Adopt crop rotation measures to effectively prevent and remove many pests.

2.3.2.4.3.2 Corn seed should receive coating treatment. Choose seed coating agent that contains benfuracarb and tebuconazole to do coating, preventing underground pests and head smut. Generally do coating according to the ratio of 1: 40~50 of medicament to seed.

2.3.2.4.3.3 During corn seedling period, choose phoxime to make bait poison to prevent and control underground pests. Adopt corn flour or furfur, after frying them, and for every 50kg, add 50% phoxime, 2.0kg emulsifiable concentrates and make into bait poison. Use bait poison 22.5~30kg for each hectare.

2.3.2.4.3.4 According to weed occurrence condition of cornfield, before or after corn seedling, choose weed killer to remove weeds. After sowing and before seedling, the weed killer can adopt 90% Harness + 80% Broadstrike 100~147 + 4g （ml）; after seedling, weed killer can choose 45 nicosulfuron + 38% atrazine + 150g （ml）.

2.3.2.4.3.5 In middle and late May, use beauveria bassiana to prevent and control corn borer, pile it, layer, spray smut, and use 1kg smut for each cubic meter. The content of smut is 8-10-million beauveria bassiana spore/100g powder. In late June and early July, near the village, set high pressure mercury lamp to carry on large-area imago killing, and lamp should be set at open site, and distance of lamp is 100~150m. Under the lamp, set round worm-catching pool, with diameter of 1.2m, depth of 12 cm. Add 50g detergent in water. In middle June and middle July, release oophagous trichogrammae to prevent corn borer, and the specific time is according to forecast of corn borer. Generally speaking, when the overwintering pupation rate of grub reaches 20%, postpone backward for 10 days, that is, in the first generation of egg stage, carry on first beekeeping, and 5-10 days later, carry on second time. For each hectare, carry on beekeeping 30 points, and in the two times, beekeeping number is altogether 225,000. Can also use beauveria bassiana to prevent corn borer.

2.3.2.4.3.6 At late corn interior leaf stage, throw grain reagent 0.2% phoxime granules, 1:10 beauveria bassiana granules etc. to corn flare opening. The granules prepared by 100g can spray 400~500 corn plants.
2.3.3 Soybean

2.3.3.1 Major pests: grey speck disease, soybean nematodiasis, root rot, budworm, aphid, and underground pests etc. Soybean field weed.

2.3.3.2 Goal of pest control: adopt agricultural prevention and control, biological prevention and control and chemical prevention and control etc. integrated measures to prevent pest and weed, reduce application amount of pesticide, and effectively control the harm of pest and weed. The specific goal is:

· the prevention and control efficient of soybean grey speck disease is over 80%; the prevention and control efficient of soybean wireworm is over 75%; the prevention and control efficient of aphid is over 90%; the prevention and control efficient of underground pests is over 90%; the prevention and control efficient of root rot is over 90%; the prevention and control efficient of weed is over 90%.

· the loss of output caused by pests is within 5%;

· time of application in the whole year reduces by 20%, and application amount of chemical pesticide reduces by 20%;

· increase of the number of natural enemies of pest, that is, each 100 plants should have over 50 natural enemies;

· ensure reasonable application of pesticide;

· safely process pesticide package and wastes.

2.3.3.3 Integrated control measures:

2.3.3.3.1 Forecast of pest: the major tasks of county plant protection station are enhancing forecast level of soybean pests occurrence and breakout, and 7-10 days before pest occurrence, tell farmers at what time, use what methods to prevent soybean pest, and in one soybean growth season, at least provide three times pest prevention and control information to farmers.

2.3.3.3.2 Breed selection: reasonably select soybean breed suitable to local conditions, with high quality, high yield and strong disease resistant property, especially breeds with strong disease resistance ability against soybean grey speck disease, virus disease and budworm. For information about specific breed, consult local plant protection station and seed management department.

2.3.3.3.3 Field management

2.3.3.3.3.1 After harvest in autumn, burn the leaves scattered in field centrally, and deep till the farmland. Apply fertilizer reasonably, pay attention to combination of nitrogen, phosphor and kalium fertilizer, which can reduce pest harm. Adopt crop rotation measures to effectively prevent and remove many pests.

2.3.3.3.3.2 Soybean seed should receive coating treatment. Choose seed coating agent that contains benfuracarb and carbendazim and thiram to do coating, preventing underground pests, soybean root rot and soybean grey speck disease. Generally do coating according to the ratio of 1: 40~50 of medicament to seed.

2.3.3.3.3.3 During initial stage of grey speck disease, use carbendazim to control soybean grey speck disease, 50% carbendazim wettable powder, 100~200gram/mu, spray.

2.3.3.3.3.4 Biologically prevent and control soybean budworm: during soybean budworm imago occurrence stage, use oophagous trichogrammae to kill eggs. Prevent bee one time during imago egg peak stage, and bee prevention amount per hectare of 300,000-450,000
head. Use beauveria bassiana to prevent husked grub. Before husking of grub, use 25kg beauveria bassiana powder per hectare. Chemically prevent and control soybean budworm: high efficient cyfluthrin control through spraying. 5% high efficient cyfluthrin, emulsifiable concentrate 30ml, mixed in water 20-50kg/mu to spray. Can also use small stick to soak dichlorphos stock solution, and insert 30-50 sticks per mu to control through suffocating.

2.3.3.3.3.5 During early stage of aphid occurrence, choose fenvalerate to control through spray. 20% fenvalerat, emulsifiable concentrate 30ml, mixed in water, 2050kg/mu, spraying.

2.3.3.3.3.6 Heterodera glycines can adopt 3% fosthietan granules, dosage of 1~5kg (a.i.) /hm².

2.3.3.3.3.7 Soybean field chemical weed removing. After sowing and before seedling stage, use weed killer 90% harness +48% Clomazone120~150+53~67ml/667m². 6.9% V-Biddie + 24% lactofen 48~70+27~33ml/667m².

2.3.4 Field vegetable

2.3.4.1 Major pests: major pests are soft rot, downy mildew, virus disease, anthracnose; insect pest are mainly cabbageworm, diamond back moth, cabbage aphid, and red spider etc.

2.3.4.2 Goal of pest control:
·Strictly implement and conform to pesticide application safe plastochrone before harvest, and regulations of forbidding using high poisonous pesticide on vegetables;
·Reduce application amount of chemical pesticide by 30%；
·Pesticide residual on vegetables does not exceed the standard regulated by the country;
·Forbid production related pesticide poisoning accident;
·Maintain the biological diversity of vegetable field, and reduce number of pests.

2.3.4.3 Prevention and control index of major pests
·Pest:
  · Soft rot: occurrence rate in field of 3~5%；
  · Downy mildew: occurrence rate in field of over 3%；
  · Virus disease: occurrence rate in field of over 3~5%, occurrence rate in field of communicated pest of 10~15%.
·Pest:
  · Diamond back moth: occurrence rate of over 15%；
  · Aphid: occurrence rate in field of 10~15%；
  · Asparagus caterpillar: occurrence rate in field of over 3%；
  · Cabbage worm: occurrence rate in field of over 15%；
  · Red spider: occurrence rate in field of over 5%.

2.3.4.4 Integrated control measures

County plant protection station and extension station should strengthen forecast, guide farmers to properly apply pesticide according to control indexes, and the vegetable field that does no reach standard should not be controlled by applying pesticide.

2.3.4.4.1 Agricultural control measures
·Choose disease resistant breeds: the disease resistance property of the different breeds of all kinds of vegetables is varied, and we can properly choose high yield anti-disease breed that suits local conditions, which is important measures for preventing and controlling vegetable pests.
· Choose seeds without pest: the ill pests often lurk or mixed into seeds and seedlings, and this may cause harm in sowing or transplanting.
· Practice crop rotation: change crops between field crops and vegetables. Crop rotation is not only beneficial to the growth of vegetable, but also can reduce the accumulation of entomopathogen source in soil.
· Deep tillage and flattening: deep till soil in advance 18~24cm, turn soil, and this can expose the pests in deep soil and reduce harm of pests.
· Maintain the hygiene of vegetable field: during growth season of vegetable, timely remove ill plants, and remove ill leaves and fruits. After harvest of vegetable, remove ill branches, deadwood, fallen leaves, and weeds, and burn them centrally.
· Artificial catching and killing: remove the egg mass of prodenia litura on leaves and “window screen leaves” of diamond back moth, and burn them centrally.

2.3.4.4.2 Physical control measures

· Induce aphid through yellow board: set 30cm square hard paper board in each mu, about 15~20 pieces. Paint a layer of engine oil on them, which can induce and kill aphid.
· Induction killing through light: using the phototaxis of pests, light a frequency vibration light in every 30 mu vegetable fields. Choose any of the above moth induction methods, and implement it in large area, which can obviously reduce the egg amount in field.

2.3.4.4.3 Biological sterilization and application of virucide and insecticide

· Agricultural streptomycin: prevent and control many kinds of bacterial disease. Cabbage soft rot adopts 72% agricultural streptomycin 10g, mixed in 36kg water, and use 200ml for each plant to irrigate the root. Pseudomonas lachrymans, for each hectare, use 150 million units agricultural streptomycin 150g, mixed in 750kg water, and spray.
· Agricultural antibiotics 120: prevent and control melon type powdery mildew, anthracnose and melon wilt and all kinds of vegetable root rot. Prevent and control powdery mildew, anthracnose, adopt 4% Nongkang120 aqua, 200 times liquid, spray. Prevent and control melon wilt and many kinds of vegetable root rot, adopt 4% Nongkang120 aqua, 150 times liquid, irrigate the root.
· Polyoxin has relatively good control effect for vegetable gray mold, cucumber downy mildew and melon wilt etc.
· Plant disease moroxydine, moroxydine and Junduqing to prevent and control tomato, pepper, melon and Cruciferae vegetable virus disease.
· Bacillus thuringiensis 10 billion living spore/gram, bacillus thuringiensis deflocculant has good control effect for diamond back moth, cabbageworm, and cotton bollworm etc.
· Abamectin, 1.8% abamectin emulsifiable concentrate has good effect for cabbageworm and red spider etc.

2.3.4.4.4 Other Control Measures

· Soft rot, the ill plant in initial disease stage should be timely removed, spray proper amount of lime for sterilization, and then adopt the following medicaments to treat it, with interval of
seven days, continuously control 3-4 times. 20% Ochthilinone 600-800 times liquid; 75% chlorothalonil 600 times liquid; 50% thiophonate-methyl 500 times liquid.

- Downy mildew, in initial disease period of field, choose 72% propamocarb aqua 600-800 times liquid; 53% Ridomil wettable powder 800 times liquid.

- Virus disease first prevent poison communication media such as aphid etc. medium insect. 50% aphid resistant wettable powder, use 10-18 gram per mu, mixed in 30-50 liter water, spray.

- Anthracnose, in initial disease period of field, 70% thiophanate methyl, 1000 times liquid, spray.

- Prevent and control grub of diamond back moth and cabbage worm: adopt 5% cascade emulsifiable concentrate or 5% chlorfluazuron emulsifiable concentrate etc. Prevent and control aphid: choose imidacloprid, cypermethrin etc. Can choose any of the above medicaments, and use the alternately. The dosage is determined according to plant density and plant size, about 30-50 kg per mu. When spraying, the two sides of leaves should be sprayed with medicament. The growth period of vegetable is short, and harm of pest is serious. The time of prevention and control is many, and we must strictly implement harvest in safe plastochrone after spraying medicament.

2.3.5 Greenhouse vegetable

2.3.5.1 Types of major pests: the main pests are: gray mold, epidemic disease and cucumber downy mildew; main pests are: white fly (white fly and white smoke fly), American Liriomyza bryoniae, aphid, and red spider etc.

2.3.5.2 Goal of pest control:

- Strictly implement harvest in safe plastochrone after spraying medicament and the regulations of forbidding use of high toxic pesticide;
- The application amount of chemical pesticide reduces by 30%;
- Pesticide residual in vegetable should not exceed the standard regulated by the country;
- Forbid production related pesticide-poisoning accident;
- Control temperature of greenhouse, and reduce the quantity of pests.

2.3.5.3 Prevention and control method

2.3.5.3.1 Reasonably use anti-disease breed

Cultivating and using anti-disease breed is the most economical and effective path. For the major pests of main vegetables, anti-disease breed has been cultivated. Can choose it according to actual situation in each place.

2.3.5.3.2 Planting and cultivation management measures

Strengthen pest monitoring and forecast, enhance the comprehensive management level of greenhouse. Optimize agriculture measures, actively carry on bodybuilding planting, scientifically apply fertilizer and irrigate water, properly ventilate and reduce temperature,
adjust temperature and humidity to strengthen the anti-disease ability of plants. Pay attention of weather forecast, do well coldness prevention, heat preservation and ventilation and humidity reduction. Closing greenhouse to preserve heat for long time can easily cause the happen of pests, and by using the features of quick temperature increase in fine weather, open greenhouse in morning to ventilate and change air for 1-2 hours, and close greenhouse and enhance the temperature. In the afternoon, before finishing work, open the greenhouse to decrease humidity for half hour to one hour, and then close the greenhouse to preserve heat until morning of the next day.

In crop rotation, reasonably practice sterilization in soil displacement. Establish scientific crop rotation system, and can practice crop rotation of cucumber-tomato, cucumber-Phaseolus vulgaris L, tomato-Phaseolus vulgaris L. Can also remove the surface soil, or use lower level soil, or change new soil. For ordinary soil disinfectants are 50% dexion wettable powder, 98% hymexazol wettable powder. Carry on surface spraying generally two weeks before planting, which can effective control or reduce the happening of soil-borne disease.

2.3.5.3.3 Physical prevention and control measures

Seed treatment: adopt dry heat treatment to seed, put seed under sunshine, soak it in warm reagent, and soak seed in salty water etc. treatment methods of process seed, which can effectively prevent and control pests.

Induction killing through yellow board: using the features of white fly and aphid of strongly attracted to yellow color, in initial disease stage, paint yellow paper board (generally 10cm x 20cm) with engine oil and hang it among the vegetables in the greenhouse, a little higher than the plant top, and paint one time for every seven days. This method can also be used to kill aphid through induction. Generally use 75-150 pieces of boards for every hectare.

Light induction: in night, many insects are attracted to light, and black light to be used to attract and collect many kinds of moth, beetle, mole cricket, and leafhopper etc. pests, and has been applied widely.

2.3.5.3.4 Prevention and control through medicament

2.3.5.3.4.1 Gray mold

- Control through dust: use 6.5% diethofencarb dust or 5% chlorothalonil dust, use15kg for each hectare, and spray one time for every seven days, and according to disease condition, can spray for consecutive 3-4 times.
- Control through smoke generator: use 25% smoke generator or 15% procymidone to, 3000g smoke generator, distribute at 5-6 places, and light it in night in closed greenhouse, and smoke one time for every seven days, and according to disease condition, can smoke for consecutive 3-4 times.
- Control through spraying: use 50% procymidone wettable powder, 1000 times liquid, or 50% iprodione wettable powder, 1500 times liquid, spray one time for 5-7 days, and according to disease condition, can smoke for consecutive 2-3 times.

2.3.5.3.4.2 Epidemic disease control

- Control through dust: use 5% chlorothalonil dust, 15kg powder for each hectare, spray one time for every seven days, spray for consecutive 2-3 times.
2.3.5.3.4.3 Cucumber downy mildew

- Control through dust: use 5% chlorothalonil dust or 5% luke dust, 15kg powder for each hectare.
- Control through smoke generator: for each hectare, use 45% chlorothalonil aerosol 1250g~2700g, put at 75-90 places, light it at night in closed greenhouse, smoke one time for every 7 days, smoke for consecutive 3-4 times.
- Control through spraying: use 72% chlorothalonil wettable powder or 58% or 12% green dairy bronze, emulsifiable concentrate 400 times, or 72.2% propamocarb aqua 800 times spray, spray for every 7 days, and spray for consecutive 2-3 times. Short time after applying the medicament, stuffy the greenhouse to enhance temperature and prevent virus, and the effect will be better.

2.3.5.3.4.4 Control through white fly

- Control through smoke generator suffocating: for each hectare, use 22% dichlorphos smoke generator, use 7500g for each hectare. Light it at night in closed greenhouse for a whole night. This method can be used to prevent and control aphid, white fly, and liriomyza bryoniae etc. many pests.
- Control through spraying: use 10% imidaclorpid wettable powder, or 3% acetamiprid emulsifiable concentrate 1000~1500 times liquid, spray. According to disease degree, generally spray one time for every 7-10 days.

2.3.5.3.4.5 Control of aphid

Except adopting smoke generator suffocating, just like white fly, can also adopt spraying. Use 10% imidaclorpid wettable powder 1500 times liquid, or 50% pirimicarb wettable powder 2000 times liquid, generally spray one time for every seven days.

2.3.5.3.4.6 Liriomyza bryoniae

Except adopting smoke generator suffocating, just like white fly, can also adopt spraying. Before two years old of grub, use 48% shlorpyrifos emulsifiable concentrate. According to disease degree, generally spray one time for every 7 days.

2.3.5.3.4.7 Red spider

When there is occurrence of spot and surface, adopt 1.8% chlorodimeform emulsifiable concentrate 4000 times liquid, spray.

2.3.5.3.5 Biological prevention and control
What is comparatively mature is that using predaceous mite to control red spider, and gets relatively good prevention effect.

2.3.6 Apple pear

2.3.6.1 Pest kind: apple scab, psylla chinensis, black spot, aphid, and carposina budworm.

2.3.6.2 Goal of pest management:
· Extend biological pesticide in order to reduce the application amount of chemical pesticide by over 30%.
· Reduce the control time of chemical pesticide by 3-5 times, and do not use forbidden pesticide breed.
· The loss of output caused by pest be controlled within 5%.
· Pesticide residual in fruit does not exceed regulated standard of China.

2.3.6.3 Pest management measures

2.3.6.3.1 Build ecological orchard. Plant watershed forest at mountaintop, and plant shelter forest at the surroundings. Promote field strip cropping, such as planting peanut, soybean etc. plants to create diversified ecological environment and create condition for rest of natural enemies. At the same time, pay attention to protect and introduce natural enemies, and maintain the biological diversity.

2.3.6.3.2 Promote fruit bagging. When fruits enter enlarging and growing period, we can timely bag it, which can effectively avoid pests and the pollution of harmful matters to fruits. And the bagged fruits have good uniformity, with even color, smooth and beautiful surface, which can obviously enhance the commercial value of fruits.

2.3.6.3.3 Preferentially choose biological pesticide and high efficient low toxic and low residual pesticide

For controlling moth, can choose liuyangmeycin, engine oil emulsion etc., for controlling scale insect, can choose engine oil emulsion, for budworm, can choose high efficient Cyfluthrin, chlorpyrifos; for controlling aphid, can choose imidacloprid etc.

2.3.6.3.4 Strictly implement pesticide safety, and use plastochrone. One month before harvesting fruit, if pesticide has to be used, choose biological pesticide.

2.3.6.3.5 Forbidden pesticide breed will implement government regulations.

2.3.6.4 Forecast and major pests control indexes

Forecast is important measures for ensuring timely prevention and control, and trainees (promoting personnel or demo household) should carry on pest forecast work in the orchard of each project.

2.3.6.5 IPM measures

According to the pest occurrence condition in each cultivation period, based on major pest object, adopt integrated control measures. It mainly includes the following five stages:

2.3.6.5.1 Spring twig budding to before blooming stage (late April)
Mainly control apple scab, beetle, and the control measures are as follows:
- Integrated measures: cut and remove the leaves will serious pests, take them out of orchard and burn them in order to reduce the base number of overwintering pests. Improve the living environment of predaceous mite etc. natural enemies of pests.
- Before budding, spray one time of mancozeb.
- Control of beetle: choose high efficient cypermethrin etc. pyrethroids pesticide.

2.3.6.5.2 Blooming to young fruit stage（Early May to early June）
Focus on controlling apple scab, psylla chinensis, black spot, aphid, beetle and red spider etc., The control measures include:
- Garden of young tree, sow peanut, soybean etc. crops, create good ecological environment.
- When entering dry and drought season, practice root shallow tillage and cover grass, which can prevent drought and maintain moisture in the soil.
- Control red spider: in occurrence stage of red spider, generally adopt the method of controlling central plants infected with pest, and if the whole orchard is infected with pests, adopt comprehensive pesticide application control. Choose Bt, amitraz, torque and liuyangmeycin etc. pesticides.
- Control aphid: can choose imidacloprid control method.

2.3.6.5.3 Fruit enlarging stage to fruit maturity stage（Late July to middle October）
Focus on controlling carposina budworm etc., and the control measures include:
- Promote fruit bagging: when fruits enter enlarging and growing stage, timely bag them.
- Control red spider: can choose pyridaben, torque and amitraz etc.

2.3.6.5.4 Overwintering dormancy to bud differentiation stage（Late October to middle February）
The management goal is clear and close orchard, and the methods are as follows:
- Control overwintering acarid and horned toad: after harvesting fruit, spray 80 times engine oil emulsion or 12 times alkali mixture.
- Paint trunk white, obstruct earth in tree root (uncover it in spring) in order to prevent coldness, sunshine and pests.
- Clear and close orchard in winter: cut and remove branches infected with pests, sweep the peeling and pest egg on trunks and main branches, sweep the wilt branches and fallen leaves on floor, and burn them centrally. For orchard clearance, can adopt 05.-1 degree Baum lime-sulfur.

Table 5: Agricultural, physical and biological measures for integrated pest control of major crops

<table>
<thead>
<tr>
<th>Crop</th>
<th>Agricultural/physical method</th>
<th>Biological method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>Pest forecast, plowland/ covered stubble, water and fertilizer management, remove or turn and cover remnant stubble/straw</td>
<td>Select resistibility breed, grown soybean at ridge, killing through sex induction, use natural enemy of pests</td>
</tr>
<tr>
<td>corn</td>
<td>Pest forecast, cultivation moulding, remove or turn and</td>
<td>Select resistibility breed, crop</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soybean</td>
<td>Cover remnant stubble/straw, remove the leaves infected with pests, catch larva through manpower rotation, use natural enemy of pests</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Peanut</td>
<td>Pest forecast, remove or turn and cover remnant stubble/straw, cultivation moulding, remove the grains infected with pests Select resistibility breed, crop rotation, use natural enemy of pests</td>
<td></td>
</tr>
<tr>
<td>Vegetable</td>
<td>Pest forecast, deep plowing, burn the leaves infected with pests, induce aphid through yellow board, induce moth through sugar and vinegar or light Select resistibility breed, crop rotation, killing through sex induction, use natural enemy of pests</td>
<td></td>
</tr>
<tr>
<td>Fruit tree</td>
<td>Pest forecast. Fruit bagging, cut and burn the branches infected with pests, deep plowing, cover a layer of grass to maintain the soil humidity, catching through light induction, paint lime on trunks Intercrop of peanut and soybean, se natural enemy of pests</td>
<td></td>
</tr>
</tbody>
</table>

**2.4 Proposed Procurement Pesticides for the Project**

Jilin Province quality and safety of agricultural products in accordance with the following criteria to select and use of pesticides: 1. The adverse health effects negligible; 2. The obvious target species; 3. On non-target species and minimize environmental impact; 4. To consider the prevention of anti-Diseases, Pests and Weeds properties. Table 6 lists the quality and safety of agricultural projects in Jilin allows the use of biological pesticides, such pesticides have been registered or are registered in the recent high-performance, low toxicity, low-residue or pesticide residues. Table 7 project in Jilin Province to allow the quality and safety of agricultural products of the bio-pesticide toxicity, the target species and non-target species and the emergence of drug-resistant cases.

The project plans to purchase and use of pesticides in line with the World Bank, the World Health Organization reference to "harmful and classified in accordance with guidelines established by the proposed classification of pesticides" (Geneva, World Health Organization, 1994-1995) standards.

The project will not purchase prohibited, non-registered, or the World Health Organization Pesticide Category I pesticides.

Table 6 Proposed procurement of bio-pesticides
<table>
<thead>
<tr>
<th>Crops</th>
<th>Major Diseases and Pests</th>
<th>Suggested Bio-agricultural Pesticides Purchases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paddy</td>
<td>Solani, Fusarium disease, rice blast, stem borer (Chilo suppressalis, medinalis), Oxya</td>
<td>Chunlei ADM, Bt</td>
</tr>
<tr>
<td>Corn</td>
<td>Head Smut, Corn Borer, spinning heart worms, small black, underground pests, seedling diseases</td>
<td>Beauveria bassiana, Trichogramma, Bt, Liuyangmycin</td>
</tr>
<tr>
<td>Soybean</td>
<td>Gray leaf spot, borer, aphids, underground pests, seedling diseases</td>
<td>Bt</td>
</tr>
<tr>
<td>Peanut</td>
<td>Stalk rot, root rot, leaf spot, aphids, pests, ground diseases and pests</td>
<td>Bt</td>
</tr>
<tr>
<td>Field Vegetable</td>
<td>Soft rot, downy mildew, anthracnose virus disease, Pieris rapae, Plutella xylostella, Tetranychus</td>
<td>Pyrimidine nucleoside antibiotics (Nongkang120), Bt, diamondback moth granulosis virus, Liuyang ADM Liuyang</td>
</tr>
<tr>
<td>Greenhouse Vegetable</td>
<td>Gray mold, downy mildew, disease, whitefly, Diaeretiella, huidobrensis</td>
<td>Polyactin adriamycin, Bt, predatory mites</td>
</tr>
<tr>
<td>Fruit Tree</td>
<td>Rot, powdery mildew, spider mite, aphid, Carposina</td>
<td>Liuyang ADM</td>
</tr>
</tbody>
</table>

Table 7 Proposed procurement of bio-pesticide toxicity, the target species and non-target species and the emergence of drug-resistant cases

<table>
<thead>
<tr>
<th>Agricultural Pesticide Name</th>
<th>Toxic Degree to Humans</th>
<th>To Target Species</th>
<th>To Non-Target Species</th>
<th>Target Species Drug-Resistance</th>
<th>Risk Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chunlei ADM</td>
<td>Low</td>
<td></td>
<td></td>
<td></td>
<td>- The adverse health effects negligible; - obvious effects on target species; - insignificant impacts on non-target species and minimize environmental impact</td>
</tr>
<tr>
<td>Bacillus (Bt)</td>
<td>low</td>
<td></td>
<td></td>
<td>ditto</td>
<td>ditto</td>
</tr>
<tr>
<td>Crops</td>
<td>Agricultural varieties</td>
<td>pesticide</td>
<td>Dosage per hectare</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------------------</td>
<td>-----------</td>
<td>--------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beauveria bassiana</td>
<td>Minor</td>
<td>Ditto</td>
<td>ditto</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trichogramma</td>
<td>No</td>
<td>Ditto</td>
<td>Ditto</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liuyang ADM</td>
<td>Low</td>
<td>Not toxic to bees, non-soluble in water; no other data available</td>
<td>Ditto</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pyrimidine nucleoside antibiotics (agricultural antibiotic 120)</td>
<td>Low</td>
<td>No data available</td>
<td>Ditto</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diamondback moth granulosis virus</td>
<td>Low</td>
<td>Ditto</td>
<td>Ditto</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADM polyactin</td>
<td>Low</td>
<td>LC50(48 小时) li-carp &gt;40mg/L Plant source, cannot be used together with acid or alkaline drugs</td>
<td>Ditto</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Predatory mite</td>
<td></td>
<td>Ditto</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.5 Project proposal to purchase the number of pesticide varieties

Priority will be given to selected projects and synthetic pesticides in agriculture considerable efficacy, physical (such as traps), biological control measures or biological pesticides (e.g. Bt). Mainly support the biological control of harmful organisms and Seed. These measures for people and livestock on the environment and minimal impact. In addition, the same crop will not be continuous, repeated use of the same pesticide, in order to avoid resistance. The following are the national registration of pesticide products, according to "guidelines for the rational use of pesticides" (National Standards) the proper use of the target crops and security, in accordance with the pesticide product labeling and manuals (based on "Pesticide labels and a detailed description of management practices" to develop) the proper use, environmental safety. "People's Republic of China Pesticide Management Ordinance" provides that: In the People's Republic of China production, operation and use of pesticides, should comply with the Regulations. "Regulations" of the pesticide registration, production, operation and use of the provisions in detail. Table 8 lists the projects approved to be purchased by the amount of pesticide varieties and hectares.

Table 8 project to be approved by the procurement of major species and hectares of the amount of pesticide
(Table 8 Suggested merger to Table 7)
<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paddy</td>
<td>● 2% Chunlei ADM liquid 1200ml</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Bt wettable powder 750 g</td>
<td></td>
</tr>
<tr>
<td>Corn</td>
<td>● seed cover drug 1000g</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Trichogramma 225000 head</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● 50 billion spores / g of Beauveria bassiana powder 1000g</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● 100 billion spores / g Bt powder 750g</td>
<td></td>
</tr>
<tr>
<td>Soybean</td>
<td>● seed cover drug 2000g</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● 100 billion spores / g Bt powder 750g</td>
<td></td>
</tr>
<tr>
<td>Peanut</td>
<td>● seed cover drug 2000g</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● 100 billion spores / g Bt powder 750g</td>
<td></td>
</tr>
<tr>
<td>Field vegetable</td>
<td>● streptomycin 4500g</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● new ADM-sik 350g</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● 100 billion spores / g Bt powder 750g</td>
<td></td>
</tr>
<tr>
<td>Greenhouse vegetable</td>
<td>● multiple anti-ADM 2000g</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● 100 billion spores / g Bt powder 750g</td>
<td></td>
</tr>
<tr>
<td>Apple pear</td>
<td>● rock &amp; sulfur combination 2300g</td>
<td></td>
</tr>
</tbody>
</table>

2.6 The ability for treating products in the acceptable risk range of final users

The assessment of the current modus operandi shows that the ability of treating pesticide of farmers and pesticide sales personnel in the acceptable risk range (that is, safe storage, using safety equipments, protective clothes, pesticide package processing and safe treatment of wastes) is different. The training plan which will be proposed will train these farmers and pesticide sales personnel according to these problems.

3. Implementation of pest management plan

3.1 Organization setting and responsibilities

Jilin Province will establish integrated pest control and supervision guiding expert group and advisory group. The supervision and control group is composed by people from provincial project office and provincial agricultural committee etc. departments; advisory group is composed by experts from scientific research organizations and extension units.
The main responsibilities of supervision guiding expert group: examination of planting industry demo base; supervision of the implementation of integrated pest control (IPM) project; assist city and county project office and project construction unit in IPM activities.

The main responsibilities of advisory group: formulation of pest management plan of the whole province; technological guidance of pest management work; assist provincial project office in supervision and assessment of project implementation condition; assist city and county plant protection station in technological examination of the project in order to decide whether to provide capital support; provide technological assistance on IPM problem; training of the people participating in the project; help to organize touring and studying activities and establish contact with international IPM project; compose field operation manual and other work relating to IMP project.

City and county plant protection station is mainly responsible for the monitoring and forecast of city and county pest and weed harm; be responsible for formulating crop pest integrated control plan of local level demo project and arranging specific person to organize implementation with township (town), farmers’ association, and production companies; be responsible for the technological training of township (town) technical personnel; adopt effective method and measures to ensure implementation of local IPM work.

Township (town) agricultural technological extension station is responsible for guiding farmers’ association to do investigation on pest and weed harm, and report to county (city) level plant protection station; under the guidance of county (city) level plant protection station, be responsible for implementing integrated pest control plan; be responsible for technological guidance and training of the participating farmers.

3.2 Ability construction

3.2.1 Training

- Carry on training to village leaders, farmers and pesticide sales person on the possible impact of pesticide on the environment, recommended application method and equipments, etc.
- Carry on supervision and administration of pesticide application, ensure not to spray pesticide near water source, and supervise and administrate together with village leaders;
- Procure safe spraying facilities approved by the project;
- Use low residual pesticide;
- Do not use pesticide near natural reserve;
- Use multi-pest control technology (agricultural/physical, biological and chemical), ensure that the pest don’t produce resistance to pesticide.

Carry on training and demonstration to village leaders and farmers and pesticide sales person in order to enhance their understanding about the following issues:

- The possible occupational/healthy impact of all kinds of pesticide
- Recommended processing and spraying method
- Approved facilities (such as sprayer, size of nozzle etc.) and using method of them
- Wear safety protection clothes (long-sleeve shirt, mask, hat, glove, long trousers, and shoe)
Apply pesticide under unwind weather
○ Safely store pesticides, put pesticides in locked cabinet, and do not be touched by children.
○ Safely process pesticide package and wastes, and try to bury them under deep soil or burn them.
  ● Monitoring implementation of above operations; If implemented not properly, carry on training again.
  ● Implement the project management measures listed in part 6.5

3.2.2 Policy issue

The pesticide management measures that will be promoted in the project include:
● Reduce pesticide application amount through project activities.
● Strictly implement pesticide management rules.
● Forbid using unregistered pesticide in project activities.
● Forbid using the type I pesticide of the World Health Organization in project activities, change to use low-toxic pesticide.
● Strictly conform to the following laws and regulations:
  ○ Pesticide management, sales and use action code of the FAO (Food and Agriculture Organization) (or correspondent legal documents of China).
  ○ Pesticide packaging and storage guideline of the FAO (Food and Agriculture Organization) (or correspondent legal documents of China).
  ○ Correct pesticide labeling method guideline of the FAO (Food and Agriculture Organization) (or correspondent legal documents of China).
  ○ Waste pesticide and pesticide container treatment guideline of the FAO (Food and Agriculture Organization) (or correspondent legal documents of China).

If certain guideline does not have correspondent legal documents of China, then we should compile this guideline for project implementation.
● Implement the environment standard of state environmental protection ministry on agricultural chemicals, including pesticide, and ecological demo county should also implement the environment standard of ecological demo counties.
● Through discussion and providing successful case and its efficiency of IPM plan (especially long-term efficiency), encourage county and township government to promote and support IPM method.
● Request the farmers that participate in demo base construction to purchase pesticide that is allowed to purchase and registered. (Table 4).
● Preferentially provide capital support for study and promotion of IPM in this project.

3.2.3 Infrastructure, ability, organization arrangement and cooperation

We will strengthen management of IPM implementation through the following methods:
● Carry on training of county and township technological and extension personnel as well as farmers (part 7.3).
Formulate a monitoring plan (Part 8) in order to assess pest management and application of IPM technology in the project.

Designate a worker from project office to be responsible for agricultural pest management and implementation of IPM method, and give proper economic support to IPM management organization.

Determine IPM as direction of research and promotion plan together with Jilin Province agricultural technology extension station and other organizations (such as Jilin Province Agricultural Science Academy).

Establish cooperation relationship with related organizations in China, strengthen cooperation, and strengthen the ability on IPM technology.

Strengthen contact between provinces, city, county, township and village, timely solve the emerging problems in order to ensure the smooth implementation of IPM.

Promote the measures and methods for reducing use of high-toxic pesticide, encourage private proprietor, especially those engaged in agricultural chemicals, to effectively adopt IPM method.

3.2.4 Training and human resource development

The training project in the project will provide training to provincial, municipal, county and township technicians and farmers.

This project will carry on the following work on pest management ability construction:

1) County plant protection experts and technicians inspect qualified organization, such as Jilin Province agricultural technology extension station and Jilin Province agricultural science academy to receive training of new methods of pest management, including specific crop/pest IMP method.

2) County plant protection experts regularly carry on training to extension personnel on pest control method, including specific crop/pest IMP method.

3) Carry on training to county and township extension personnel to ensure effective implementation of pesticide rules.

4) Through farmers’ field school etc, method, county technicians regularly and timely carry on training to farmers on new method of pest control and specific crop/pest IMP training.

5) Compile and distribute IPM training materials. Language in materials should be brief, and be matched with correspondent viewing and listening textbooks.

6) Encourage more women to participate in pest management and IMP plan and let them play a leading role in this plan.

7) In applied research project, carry on IPM applied technology study according to agriculture production and actual needs of farmers.

3.2.5 Training of farmers

The goal of farmers’ training is to strengthen safety of farmers and let the master skill on biological control of ordinary pest, strengthen the ability for economically and effectively
controlling pest, including: how to identify pest, how to adopt correct prevention and control measures and how to adopt appropriate prevention and control measures, etc.

Each farmer will receive 3-4 times’ training during pest control period each year (one day each time, train 50 farmers), and the contents of training include:

1. Features of pests
2. Harm of all kinds of pests
3. The natural enemies of all kinds of pests
4. Method of field investigation
5. Prevention and control index
6. Control measures, including integrated agricultural, physical, biological and chemical IPM method; safely store, manage, and process pesticide wastes and packaging containers.
7. Using method and protection requirement of chemical pesticide

The trainees may include:
1. Leading big household and demo household
2. Provincial, county and city extension personnel that have received training
3. Pesticide sales personnel
4. Jilin Province agricultural technology extension station
5. Other organizations of China and Jilin (such as Jilin Province Agricultural Science Academy)

3.3 Monitoring assessment

3.3.1 Activities that need monitoring in implementation process

- Degree of adopting IPM of farmers
- Use method of pesticide
- Change of agricultural ecological system
- Other indexes

Provincial PMO will engage pest management experts to supervise the PMP implementation during the pest peak season.

3.3.2 Proposed monitoring indexes

1. Monitoring indexes

   The adoption degree of integrated management measures:
   - Number of farmers that adopt integrated management measures in sampling investigation
   - Total farmland area that adopts integrated management measures
   - Number of farmers that adopt anti-disease breeds
   - Number of farmers that can understand natural enemies pests
● Number of farmers that participate in integrated pest management

Application method of pesticide:
● The time of pesticide application of each kind of crop/hectare/planting season
● Pesticide type and quantity of each kinds of crop/hectare/planting season (check whether use the type I or unregistered pesticide of the World Health Organization)
● Cost of pesticide of each kind of crop/hectare/planting season
● Number of farmers that adopt pesticide safety treatment and application procedure (such as: safe storage, wearing protective clothing etc.)
● Standard exceeding quantity of pesticide in agricultural produce
● Complaining quantity for standard exceeding of pesticide residual
● Quantity that is denied trade due to pesticide residual of agricultural produce
● Occurrence quantity of pest resistibility
● Occurrence quantity of pesticide poisoning of the mass
● Other forms of environment poisoning or pollution, such as: livestock (fowl), wild animal, bee poisoning and water pollution and soil pollution etc.

Crop production:
● Crop output per hectare
● Profit per hectare
● Agricultural ecological system:
● Pesticide breakout quantity and type of each kind of crop/each year
● Quantity of predates and parasitic natural enemy of pests in each unit area in each trial area
● Diversity of benign insect type and of quantity, such as: the quantity of bee in each trial area etc.

Other indexes:
● Number of visiting of pesticide sales personnel to project area
● Number of broadcasting time of pesticide advertisements in media (TV, broadcasting and newspaper)
● Pesticide brand quantity sold in the retail outlet of project area
● Number of sold pesticide brand

2. Content of checking

Pesticide registration:
● Registration condition of new pesticide:

Using condition of type I pesticide:
 ● Check the pesticide cabinet on the spot of pesticide sales outlet and farmers in the project area in order to determine whether the project area sells or uses type I pesticide

Policy issue:
● The allowance degree of government to pesticide (if there is).
● Implementation condition of the policies, laws and regulations on use of pesticide and promoting integrated control of pests

Monitoring condition:
● The assessment of World Bank inspection group on local monitoring plan
● Problems in implementing IPM
● Checking condition of each level
3.3.3 Monitoring and Supervision

- Monitoring of pest management: carried on by each level of project office, plant protection station and agricultural association, when discovering pest, report and deal with it in time;
- Inspection plan: be responsible by each level of project office at usually time, in pest peak stage, the plant protection station is responsible for inspection and control;
- Responsibility: each level of plant protection station is responsible for the guidance, inspection, monitoring and training of IPM, and undertake the responsibility and obligation of timely discovering and reporting pest condition and implementing IPM according to requirement;
- Needed specialized technology: each level of plant protection station provides experts on plant protection and IPM method.
- Budget: The pest management work of the project should be listed into the daily management of each level of project office, and needed fund will be listed into the fund budget of the project office.

3.3.4 Arrangement of implementing pest plan progress report

- The project undertaker has the obligation to timely submit project progress report each year, and in project implementation middle term, submit middle term implementation report, and at project completion, submit project implementation report.
- The project annual report and middle term report includes project implementation year number, using condition of project fund, project progress, project implementation effect, difference between project implementation effect and expected effect, and problems and solutions in implementing the project etc.;
- At project completion, submit project report, including implementation year number, using condition of project fund, project progress, project implementation effect and assessment, difference between project implementation effect and expected effect, problems and solutions in implementing the project etc.; project implementation effect assessment refers to adoption of standardized promotion technology, increase of farmers income, improvement degree due to use of new technology, the level of agricultural produce quality and safety, impact on ecological environment, continuousness of project, and project organization and management etc. Through the completed project effect assessment, we analyze the comprehensive achievement of project implementation.

4. Estimate of fund

The special purpose training fund for integrated pest control technology is 3,510,800 Yuan.

<table>
<thead>
<tr>
<th>Item</th>
<th>Fund budget (unit: 10,000 Yuan)</th>
</tr>
</thead>
</table>

34
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>351.08</td>
</tr>
<tr>
<td>I. Training of provincial level personnel</td>
<td></td>
</tr>
<tr>
<td>1. Technology extension and research personnel</td>
<td>8.89</td>
</tr>
<tr>
<td>2. Management extension personnel of production enterprise</td>
<td>13.33</td>
</tr>
<tr>
<td>Subtotal of provincial level</td>
<td>22.22</td>
</tr>
<tr>
<td>II. Training of municipal level personnel</td>
<td></td>
</tr>
<tr>
<td>1. Municipal teaching staff (provincial level training)</td>
<td>8.80</td>
</tr>
<tr>
<td>2. Technology extension personnel</td>
<td>4.44</td>
</tr>
<tr>
<td>3. Distributing business</td>
<td>2.22</td>
</tr>
<tr>
<td>Subtotal of municipal level</td>
<td>15.47</td>
</tr>
<tr>
<td>III. Training of county level personnel</td>
<td></td>
</tr>
<tr>
<td>1. County level teaching staff (provincial level training)</td>
<td>40.09</td>
</tr>
<tr>
<td>2. Technology extension personnel</td>
<td>6.67</td>
</tr>
<tr>
<td>3. Distributing business</td>
<td>2.22</td>
</tr>
<tr>
<td>Subtotal of county level</td>
<td>48.98</td>
</tr>
<tr>
<td>IV. Training of township level personnel</td>
<td></td>
</tr>
<tr>
<td>Training of farmers</td>
<td>264.40</td>
</tr>
</tbody>
</table>

Due to the demo base construction is open-end project, and the construction site, quantity and specific construction contents are still not clear. Other fees in implementing IPM, such as consultation service fee, environmental protection and monitoring fee and project management fee etc. fees will be calculated once the demonstration sites are selected.
Annex:

Tables for the Pest Management Plan
## Pest Management Plan
### A Mitigation

<table>
<thead>
<tr>
<th>Project Activity</th>
<th>Potential Environmental and Health Impacts</th>
<th>Proposed Mitigation Measure(s)</th>
<th>Institutional Responsibilities</th>
<th>Cost Estimates</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstration Sites for Good Agricultural Practices (A.2). This sub-component would support the establishment of 200-300 demonstration sites on farmers’ fields for different farm production types and</td>
<td>- Farmer may not handle, store and apply pesticide properly.</td>
<td>- Raise awareness about regulations of pesticide management and use by providing the farmers from the demonstration sties with trainings of handling, storing and applying pesticides; and</td>
<td>- City and County PMO under the assistance of technicians from Agricultural Technology Promotion Stations(ATPS); - Provincial PMO to engage an institution to provide training for city and county PMP and technicians from ATPS.</td>
<td>900,000</td>
<td></td>
</tr>
</tbody>
</table>
locations in order to encourage the adoption of good agricultural practices that improve agricultural product safety and quality.

- Farmers may use highly toxic pesticides.
- Pesticides classified as WHO IA, IB will not be used under this project;
- To closely communicate with local Quality Supervision Agencies, strengthening pesticide distribution and application within demonstration sites.
- City and county PMO
- Farmer association and farmers from demonstration sites

- Farmers may use excessive chemical pesticides;
- Promoting IPM, including introducing biological and botanical pesticides for the demonstrations sites.
- To procure physical and biological pest control gear/equipment for the demonstration sites.
- Technicians from ATPS at county/city levels
- farmers Associations and farms;

- Awareness of IPM may not be sufficient.
- Training and capacity building by providing IPM training for the farmers from demonstration sites, technicians from ATPS, pesticide distribution personnel, and city/county PMOs
- City and County PMOs;
- City and county PMO
- Farmer association and farmers from demonstration sites

| N.A | TBD | The cost for the IPM promoting will be determined after the demonstration sites are selected during project implementation. |
| 2,700,000 |
## Pest Management Plan
### B Monitoring

<table>
<thead>
<tr>
<th>Proposed Mitigation Measure</th>
<th>Parameters To be Monitored</th>
<th>Location</th>
<th>Data and/or Measurements</th>
<th>Frequency of Measurement</th>
<th>Responsibilities</th>
<th>Cost</th>
</tr>
</thead>
</table>
| Promote IPM (e.g. for farmland of rice, corn, soybean, peanuts, vegetables), including introducing biological and botanical pesticides | - Pesticide consumption for the farmland to be financed under the project vs. baseline consumption;  
- Crop loss of the farmland vs. baseline of crop loss;  
- Percentage of IPM adopted farmland in the total farmland financed under the project; | Demonstration sites | - Pesticide consumption  
- Crop loss  
- Area of farmland for which IPM is adopted for the demonstration sites | Once every year | County and City PMO  
Provincial PMO | 750,000 |
<p>| Raise awareness about regulations of pesticide management and use by providing | - Total number of farmers receiving training of regulations of pesticide | Demonstration sites | number of farms attendance for each training | After each training | County and City PMO | N.A     |</p>
<table>
<thead>
<tr>
<th>Training and capacity building by providing farmers from demonstration sites, technicians from ATPS, pesticide distribution personnel with IPM training.</th>
<th>- Total number of people receiving training</th>
<th>Demonstration sites</th>
<th>number of trainee attendance for each training</th>
<th>After each training</th>
<th>County and City PMO</th>
<th>N.A</th>
</tr>
</thead>
<tbody>
<tr>
<td>the farmers from the demonstration sites with trainings of handling, storing and applying pesticides.</td>
<td>management and use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Pest Management Plan  
C Institutional Strengthening and Training for Implementation

<table>
<thead>
<tr>
<th>Institutional Strengthening Activity</th>
<th>Position(s)</th>
<th>Scheduling</th>
<th>Responsibility(ies)</th>
<th>Cost Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>To establish a PMP supervision for the Project</td>
<td>The leading team consists staff from Provincial PMO and Provincial Agricultural Department;</td>
<td>The PMP supervision team will be established prior to/at the start of the project implementation and will supervise the PMP implementation throughout the project.</td>
<td>Provincial PMO</td>
<td>NA</td>
</tr>
<tr>
<td>To establish an IPM consulting team for the Project</td>
<td>The IPM consulting team consists of experts from research institutions and ATPSs.</td>
<td>The IPM consulting team will be established prior to/at the beginning of the project implementation and will support the PMP implementation throughout the project.</td>
<td>Provincial PMO</td>
<td>TBD</td>
</tr>
<tr>
<td>To establish city and county PMOs</td>
<td>The city and county PMOs consisting staff from Agricultural Comprehensive Office at city/county level</td>
<td>The city and county PMOs will be established prior to/at the beginning of the project implementation and will support the PMP implementation throughout the project.</td>
<td>Agricultural Comprehensive Office</td>
<td>N.A</td>
</tr>
</tbody>
</table>

II Training Activity

<table>
<thead>
<tr>
<th>Participants</th>
<th>Types of Training</th>
<th>Content (modules, etc.)</th>
<th>Scheduling</th>
<th>Cost Estimates</th>
</tr>
</thead>
</table>

<p>| 6 |</p>
<table>
<thead>
<tr>
<th>Project Area</th>
<th>Participants</th>
<th>Training Method</th>
<th>PMP Implementation and IPM Technology</th>
<th>Duration</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMP Implementation.</td>
<td>Farmers from the demonstration sites, pesticide distribution personnel, technicians from Plant Protection Stations and ATPSs, PMOs.</td>
<td>Face-to-face training</td>
<td>PMP implementation and IPM technology</td>
<td>Y1-Y3</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Regulations of pesticide management and use</td>
<td>Farmers from the demonstration sites, pesticide distribution personnel, technicians from Plant Protection Stations and ATPSs, PMOs.</td>
<td>Face-to-face training</td>
<td>Pesticide management</td>
<td>Y1-Y3</td>
<td>2,700,000</td>
</tr>
</tbody>
</table>
## Pest Management Plan
### D Scheduling and Reporting

<table>
<thead>
<tr>
<th>Activity</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
</tr>
<tr>
<td><strong>Mitigation Measures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Promote IPM including introducing biological and botanical pesticides</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>- Raise awareness about Regulations of pesticide management and use</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>- Training and capacity building by providing farmers from demonstration sites, technicians from ATPS, pesticide distribution personnel with IPM training.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Monitoring</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Promote IPM including introducing biological and botanical pesticides</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>- Raise awareness about Regulations of Pesticide Management and Use</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>- Training and capacity</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
building by providing farmers from demonstration sites, technicians from ATPS, pesticide distribution personnel with IPM training.

<table>
<thead>
<tr>
<th>Institutional Strengthening</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>- To establish an PMP supervision team and an IPM consulting team</td>
<td>X</td>
</tr>
<tr>
<td>- To establish city and county PMOs</td>
<td>X</td>
</tr>
</tbody>
</table>
Attachment 1 List of forbidden pesticides in China

<table>
<thead>
<tr>
<th>Pesticide</th>
<th>Announcement Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>BHC</td>
<td>199</td>
</tr>
<tr>
<td>DDT</td>
<td>199</td>
</tr>
<tr>
<td>strobane</td>
<td>199</td>
</tr>
<tr>
<td>dibromochloropropane</td>
<td>199</td>
</tr>
<tr>
<td>chlordimeform</td>
<td>199</td>
</tr>
<tr>
<td>EDB</td>
<td>199</td>
</tr>
<tr>
<td>nitrofen</td>
<td>199</td>
</tr>
<tr>
<td>aldrin</td>
<td>199</td>
</tr>
<tr>
<td>dieldrin</td>
<td>199</td>
</tr>
<tr>
<td>mercury compounds</td>
<td>199</td>
</tr>
<tr>
<td>arsenide</td>
<td>199</td>
</tr>
<tr>
<td>plumbum compounds</td>
<td>199</td>
</tr>
<tr>
<td>N,N’-Methylene bis -(2-amino -1,3,4-thiadiazole)</td>
<td>199</td>
</tr>
<tr>
<td>fluoroacetamide</td>
<td>199</td>
</tr>
<tr>
<td>gliftor</td>
<td>199</td>
</tr>
<tr>
<td>tetramine</td>
<td>199</td>
</tr>
<tr>
<td>sodium fluoroacetate</td>
<td>199</td>
</tr>
<tr>
<td>silatrane</td>
<td>199</td>
</tr>
<tr>
<td>methamidophos</td>
<td>274</td>
</tr>
<tr>
<td>parathion-methyl</td>
<td>274</td>
</tr>
<tr>
<td>parathion</td>
<td>274</td>
</tr>
<tr>
<td>monocrotophos</td>
<td>274</td>
</tr>
<tr>
<td>phosphamidon</td>
<td>274</td>
</tr>
</tbody>
</table>
## Attachment 2 List of forbidden pesticides in China

<table>
<thead>
<tr>
<th>Name of effective constituent</th>
<th>Restricted crop</th>
<th>Number of announcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>fenamiphos</td>
<td>vegetable, fruit tree, tea leaf, Chinese medicinal material</td>
<td>Number 199 announcement of the Ministry of Agriculture</td>
</tr>
<tr>
<td>fonofos</td>
<td>vegetable, fruit tree, tea leaf, Chinese medicinal material</td>
<td>Number 199 announcement of the Ministry of Agriculture</td>
</tr>
<tr>
<td>daminozide</td>
<td>peanut</td>
<td>Number 274 announcement of the Ministry of Agriculture</td>
</tr>
<tr>
<td>phorate</td>
<td>vegetable, fruit tree, tea leaf, Chinese medicinal material</td>
<td>Number 199 announcement of the Ministry of Agriculture</td>
</tr>
<tr>
<td>phosfolan-methyl</td>
<td>vegetable, fruit tree, tea leaf, Chinese medicinal material</td>
<td>Number 199 announcement of the Ministry of Agriculture</td>
</tr>
<tr>
<td>isofenphos-methyl</td>
<td>vegetable, fruit tree, tea leaf, Chinese medicinal material</td>
<td>Number 199 announcement of the Ministry of Agriculture</td>
</tr>
<tr>
<td>carbofuran</td>
<td>vegetable, fruit tree, tea leaf, Chinese medicinal material</td>
<td>Number 199 announcement of the Ministry of Agriculture</td>
</tr>
<tr>
<td>phosfolan</td>
<td>vegetable, fruit tree, tea leaf, Chinese medicinal material</td>
<td>Number 199 announcement of the Ministry of Agriculture</td>
</tr>
<tr>
<td>isazofos</td>
<td>vegetable, fruit tree, tea leaf, Chinese medicinal material</td>
<td>Number 199 announcement of the Ministry of Agriculture</td>
</tr>
<tr>
<td>ethoprophylos</td>
<td>vegetable, fruit tree, tea leaf, Chinese medicinal material</td>
<td>Number 199 announcement of the Ministry of Agriculture</td>
</tr>
<tr>
<td>demeton</td>
<td>vegetable, fruit tree, tea leaf, Chinese medicinal material</td>
<td>Number 199 announcement of the Ministry of Agriculture</td>
</tr>
<tr>
<td>dicofol, fenvalerate</td>
<td>tea plant</td>
<td>Number 199 announcement of the Ministry of Agriculture</td>
</tr>
<tr>
<td>terbufos</td>
<td>sugarcane</td>
<td>Number 194 announcement of the Ministry of Agriculture</td>
</tr>
<tr>
<td>terbufos</td>
<td>vegetable, fruit tree, tea leaf, Chinese medicinal material</td>
<td>Number 199 announcement of the Ministry of Agriculture</td>
</tr>
<tr>
<td>aldicarb</td>
<td>vegetable, fruit tree, tea leaf, Chinese medicinal material</td>
<td>Number 199 announcement of the Ministry of Agriculture</td>
</tr>
<tr>
<td>omethoate</td>
<td>broccoli</td>
<td>Number 194 announcement of the Ministry of Agriculture</td>
</tr>
<tr>
<td>coumaphos</td>
<td>vegetable, fruit tree, tea leaf, Chinese medicinal material</td>
<td>Number 199 announcement of the Ministry of Agriculture</td>
</tr>
<tr>
<td>sulfotepe</td>
<td>vegetable, fruit tree, tea leaf, Chinese medicinal material</td>
<td>Number 199 announcement of the Ministry of Agriculture</td>
</tr>
</tbody>
</table>
Attachment 3 Technical regulations for production of non public hazard vegetable in Jilin Province (DB22/T948—2001)

1 Scope

This standard regulates the requirement of planting technology in the production of non public hazard vegetable, integrated control of harmful organism, control technology of pests, fertilizer application technology and timely harvesting.

This standard is applicable to the production of non public hazard vegetable in Jilin Province.

2 Standardized Applicable Documents

The articles in the following documents become the articles of this standard through the application of this standard. For the applicable document noted with date, all the followed amended copies (not including errata contents) or amendments are not applicable to this standard. We encourage each party that reach agreement according to this standard to study whether to use the latest copy of these documents. For the documents not noted with date, the latest edition is applicable to this standard.

| GB4285—1989     | Standards for safety application of pesticides |
| GB8321.1—1987   | Guideline for safety application of pesticides (I) |
| GB8321.2—1987   | Guideline for safety application of pesticides (II) |
| GB8321.3—1989   | Guideline for safety application of pesticides (III) |
| GB8321.4—1993   | Guideline for safety application of pesticides (IV) |
| GB8321.5—1997   | Guideline for safety application of pesticides(V) |
| GB8321.6—1997   | Guideline for safety application of pesticides (VI) |
| DB22/T946—2001  | Standard for environment quality of non public hazard vegetable production area |

DB22/T947—2001 Standard for environment quality of non public hazard vegetable production area

3 Definition

Non public hazard vegetable: the commercial vegetable whose environment of production area is clean, without pollution, production is organized according to unique production technical regulations, and the content of poisonous and harmful organisms in vegetable product should be controlled with allowed limit.

4 Requirement of production base environment

4.1 The production base environment of non public hazard vegetable conform to regulations in DB22/T947—2001.
4.1.1 Requirement on soil: The soil in the production base of non public hazard vegetable contains rich organic matters, is convenient for drainage and irrigation, deep tillage, fertile soil with flat topography.

5 Planting technology

5.1 Breed selection: choose anti-disease, quality, high yield, strong adverse resistance and good commercialization breed according to different areas.

5.2 Seed treatment: adopt physical or medicament treatment to sterilize seed before sowing.

5.3 Cultivate strong seedlings

5.3.1 Bed soil sterilization: can use chemical medicament and use sunshine isolation in high temperature season to carry on base sterilization.

5.3.2 Management in seedling stage: timely divide seedlings, and thin, eliminate through selection inferior, ill and weak seedlings, and plant them according to category.

5.4 Field management

5.4.1 Planting at proper time: according to different vegetable breeds, choose proper sowing stage to carry on seedling cultivation, and plant them at proper time. Choose suitable sowing stage for direct sowing vegetable.

5.4.2 Fine tillage: deep turn and flatten soil, reasonable practice intercrop, mixed cropping, and under crop sowing, timely till and remove weeds. Drain and irrigate water at proper time.

6 Pesticide control technology

6.1 The principle of pest control

With agricultural measures as the basis, with bodybuilding planting as the main line, collect, improve, and optimize vegetable field ecological system through planting technology; full bring into play the effect of natural control factors in vegetable field, and increase the harmful organism resistant ability of vegetables; optimize agricultural control, physical control; strengthen biological control and ecological control, reduce chemical control, strengthen nutritional control and control the harm of vegetable harmful organism within allowed ecological threshold value, and produce safe and quality vegetables.

6.2 Agricultural control

6.2.1 Clean field: Protected reserve should timely remove ill and wilt branches and blemished leaves, ill fruits and clean the greenhouse. For open air planting, timely remove the wilt leaves and weeds of the preceding vegetable, take them out of the field, centrally bury them deep or burn them, reduce disease source and pest source.

6.2.2 Reasonable crop rotation: practice over 2—3 years crop rotation of not the same breed.

6.2.3 Grafting root changing: strengthen adverse resistance, and prevent soil-borne disease.

6.3 Physical control

6.3.1 Control through induction killing: use light, high pressure mercury light, vibration frequency worm induction light or yellow board and blue board to kill pests.

6.3.2 Use ground film, black film, gray film, weed removal film, drop-free film, ultraviolet isolation film, and worm prevention net etc. all kinds of methods to prevent disease, control pests and remove weeds.
6.3.3 Kill pests by using the living habits of pests. Use sugar and vinegar liquid, sex pheromone, poplar branch etc. to kill pests through induction.
6.3.4 Control through heat energy. Expose seed under sunshine, stuffy greenhouse under high temperature to prevent pests. Expose soil in high temperature to kill pests in soil.
6.4 Biological control
6.4.1 Control pest with pest. Use ladybug, drone fly, green lacewing, assassin bug and spider etc. natural enemies to control pests; use oophagous trichogrammae, encarsia formosa etc. parasitic natural enemies to control pests.
6.4.2 Control pest with bacteria. Use Bacillus thuringiensis (Bt) etc. bacteria; aphid mildew, beauveria bassiana, metarhizium etc. epiphyte, nuclear polyhedrosis virus (NPV), granulosis virus, avermectin, liuyangmeycin etc. antibiotics and microconidia etc. biological pest control.
6.4.3 Use plant source pesticide such as derris root, kushenin, nicotine, hellebore sophoranol, melia azedarach, chitosan alkali, and pyrethrin etc. to control many kinds of pests.
6.4.4 Use bacteria to control bacteria (including bacteriophage): use trichodermin, Bacillus subtilis B1 etc. antimicrobial, cucumber mosaic virus satellite vaccine S2 and tobacco mosaic virus weak vaccine N14, jinggangmycin, polyoxin, qingfengmeisu, Nongkang120, B0—10(Wuyi Emamectin), agricultural streptomycin and new phytomycin etc. agricultural bacteriophage to control pests.
6.5 Ecological control
6.5.1 Improve facilities and perfect function. Change the ordinary covering material into drop-free covering, change greenhouse exposed land into land covered with ground film, change surface water irrigation into underground irrigation, change bedding planting into half-high planting. Control humidity in greenhouse, and reduce occurrence of pests.
6.5.2 Stuffy greenhouse under high temperature. During greenhouse resting period, carry on high temperature sterilization treatment.
6.5.3 Intercrop of high crop and vegetable
6.6 Nutritional control
6.6.1 Prevent and control sugar disease. When the sugar content on plants reach 2.0—2.2%, spray 1% dextrose, 1% cane sugar or sugar and vinegar liquid (1%+1%).
6.6.2 Spray fertilizer and trace element fertilizer on leaves. According to deficiency symptom of crops, determine suitable trace element breed.
6.7 Chemical control
6.7.1 Forbid using high-toxic and high residual pesticide. Choose low-toxic and low-residual pesticide (LD50＞500mg/kg) (look at attachment 1).
6.7.2 Reasonably use fertilizer. According to the vegetable pest occurrence condition, choose proper pesticide. Choose the most suitable pesticide breed according to different control objects and property difference of pesticides.
6.7.3 Improve fertilizer application method. According to different rules of occurrence of different pests, choose different pesticide application method. Do not apply pesticide to the whole plant when local application is needed, and control it selectively, and do not randomly increase dosage.
6.7.4 Alternate pesticide application. Correctly mix pesticides. Alternately use pesticides of different kinds.
6.7.5  Strictly implement pesticide safe plastochrone to ensure the pesticide residual does not exceed standard when entering market (look at attachment 3).

7  Fertilizer application technology

7.1  Principle of fertilizer application technology: reasonably apply fertilizer, balance fertilizer application, mainly use organic fertilizer in order to maintain or increase fertility of soil and the activity of soil organism. Apply fertilizer based on soil and vegetable formula.

7.2  Requirement of fertilizer application

7.2.1  Principle of fertilizer application: mainly apply mature organic fertilizer, and lay focus on base fertilizer, and reasonably add fertilizer. When adding fertilizer, strictly control the application amount of nitrogenous fertilizer. Do not apply little nitrate nitrogen fertilizer. Adopt fertilizer application through measuring soil.

7.2.2  Vigorously enhance application of organic fertilizer and biological fertilizer. Advocate using fertilizer kind (look at attachment 4).

7.2.3  Restrict the application amount of quick effect fertilizer (look at attachment 5).

7.2.4  Forbid applying harmful garbage, dirt and waste water in cities, hospitals and industrial areas.

7.2.5  The applied fertilizer must pass registration certification and production approval of related department, and quality should reach related standard and requirement before application.

8  Requirement of harvesting
After pesticide safe plastochrone, harvest it at proper time, and the tools used in harvesting should be clean, sanitary and pollution-free.

Attachment Table 1  Chemical pesticides not allowed using in production of non public hazard vegetables

<table>
<thead>
<tr>
<th>Kind of pesticide</th>
<th>Name of pesticide</th>
<th>Prohibited crop</th>
<th>Reason of prohibition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inorganic arsenic pesticide</td>
<td>Calcium arsenate, lead arsenate</td>
<td>All crops</td>
<td>High poison</td>
</tr>
<tr>
<td>Organic arsenic pesticide</td>
<td>Zinc methylarsonate, ammonium ferric methylarsonate, urbazid, asomate</td>
<td>All crops</td>
<td>High residual</td>
</tr>
<tr>
<td>Organic tin pesticide</td>
<td>Fentinactate (Fentin acetate), fentin chloride, fentin hydroxide, stannic chloride</td>
<td>All crops</td>
<td>High residual</td>
</tr>
<tr>
<td>Organic mercury pesticide</td>
<td>Ethyl mercury chloride (Ceresan), Phenylmercuric Acetate (Agrosan)</td>
<td>All crops</td>
<td>High poison, high residual</td>
</tr>
<tr>
<td>Organic heterocycles</td>
<td>Fluoroacetamide</td>
<td>All crops</td>
<td>teratogenesis</td>
</tr>
<tr>
<td>Fluoride</td>
<td>Calcium fluoride, sodium fluoride, sodium fluoroacetate, fluoroacetamide, sodium fluoro-aluminate, sodium fluosilicate</td>
<td>All crops</td>
<td>Super poison, high poison, can easily cause hazard</td>
</tr>
<tr>
<td>Organic chlorine pesticide</td>
<td>DDT, benzene hexachloride, Lindane, aldrin, dieldrin, santobrite, chlordane</td>
<td>All crops</td>
<td>High residual</td>
</tr>
<tr>
<td>Organic chlorin acaricide</td>
<td>Dicofol</td>
<td>Vegetable fruit tree, tea leaf</td>
<td>The industrial products produced in China contains certain amount of DDT</td>
</tr>
<tr>
<td>Alkylogen pesticide</td>
<td>Dibromethane, dibromochloropropane</td>
<td>All crops</td>
<td>Cause cancer, teratogenesis</td>
</tr>
<tr>
<td>Organic phosphor pesticide</td>
<td>cyanamid-3911, disulfoton, monocrotophos, parathion, parathion-methyl, methamidophos, omethoate, sulfotep, coumaphos, isocarbophos, phosphamidon, demeton, carbofuran</td>
<td>Vegetable fruit tree, tea leaf</td>
<td>High poison</td>
</tr>
<tr>
<td><strong>Organic phosphor pesticide</strong></td>
<td>Kitazine, Kitazin P</td>
<td>All crops</td>
<td>Stink</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------</td>
<td>-----------</td>
<td>-------</td>
</tr>
<tr>
<td><strong>Carbamate pesticide</strong></td>
<td>carbofuran, aldicarb, methomyl</td>
<td>All crops</td>
<td>High poison</td>
</tr>
<tr>
<td><strong>Dimethyl formamidine pesticide and acaricide</strong></td>
<td>chlordimeform</td>
<td>All crops</td>
<td>chronic toxicity, teratogenesis</td>
</tr>
<tr>
<td><strong>Pyrethroid Pesticide</strong></td>
<td>All pyrethroid pesticides</td>
<td>Rice</td>
<td>Big toxicity to fish</td>
</tr>
<tr>
<td><strong>Substituted benzene pesticide</strong></td>
<td>pentachloronitrobenzene, (pentachlorobenzyl alcohol) Blastin, benomyl</td>
<td>All crops</td>
<td>There is teratogenesis abroad or secondary harm</td>
</tr>
<tr>
<td><strong>Diphenyl ether weed killer</strong></td>
<td>Nitrofen, chlornitrofen</td>
<td>All crops</td>
<td>chronic toxicity</td>
</tr>
</tbody>
</table>
## Attachment Table 2 Standard of reasonable application of non public hazard vegetable

<table>
<thead>
<tr>
<th>Pesticide</th>
<th>Dosage form and content</th>
<th>Applicable crop</th>
<th>Major control objects</th>
<th>Application amount (preparation) gram/ml/mu·time or dilution times (density of effective element/ml/gram)</th>
<th>Application method</th>
<th>Maximal using times each season</th>
<th>Safe plastochrone</th>
<th>Statement of Application point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abamectin</td>
<td>Hajimie</td>
<td>1.8%emulsifiable concentrate</td>
<td>Leaf vegetables</td>
<td>diamond back moth</td>
<td>33-50ml spray</td>
<td>1</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Cis-form cypermethrin</td>
<td>Fastac</td>
<td>10%emulsifiable concentrate</td>
<td>Cucumber</td>
<td>aphid</td>
<td>5-10ml spray</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Bifenthrin</td>
<td>Uranus</td>
<td>10%emulsifiable concentrate</td>
<td>tomato(greenhouse)</td>
<td>white fly, acarid</td>
<td>5-10ml spray</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Chlorfluazuron</td>
<td>Chlorfluazuron</td>
<td>5%emulsifiable concentrate</td>
<td>broccoli</td>
<td>cabbage worm, diamond back moth</td>
<td>40-80ml spray</td>
<td>3</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Chlorpyrifos</td>
<td>Chlorpyrifos</td>
<td>40.7%emulsifiable concentrate</td>
<td>Leaf vegetables</td>
<td>cabbage worm, diamond back moth</td>
<td>50-70ml spray</td>
<td>2</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Lambda-cyhalothrin</td>
<td>Kung fu</td>
<td>2.5emulsifiable concentrate</td>
<td>Leaf vegetables</td>
<td>aphid, cabbage worm, diamond back moth</td>
<td>25-50ml spray</td>
<td>3</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Cypermethrin</td>
<td>Anlvbao, Xingmianbao, Saibok, Miebaoke</td>
<td>10%emulsifiable concentrate</td>
<td>Leaf vegetables</td>
<td>cabbage worm, diamond back moth</td>
<td>20-30ml spray</td>
<td>3</td>
<td>1</td>
<td>Green vegetable 1, Chinese cabbage 5, Chinese cabbage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>tomato</td>
<td>aphid, cotton bollworm</td>
<td>20-30ml spray</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>25%emulsifiable concentrate</td>
<td>Leaf vegetables</td>
<td>cabbage worm, diamond back moth</td>
<td>20-40ml spray</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Deltamethrin</td>
<td>decis</td>
<td>2.5emulsifiable concentrate</td>
<td>Leaf vegetables</td>
<td>cabbage worm, diamond back moth</td>
<td>12-16ml spray</td>
<td>3</td>
<td>2</td>
<td>Chinese cabbage</td>
</tr>
<tr>
<td>Cis-form fenvalerate</td>
<td>esfenvalerate</td>
<td>5%emulsifiable concentrate</td>
<td>Leaf vegetables</td>
<td>cabbage worm, diamond back moth</td>
<td>10-20ml spray</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Etofenprox</td>
<td>duolaibao</td>
<td>10% suspending agent</td>
<td>broccoli</td>
<td>cabbage worm</td>
<td>30-40ml spray</td>
<td>3</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Fenpropathrin</td>
<td>Meothrin</td>
<td>20%emulsifiable concentrate</td>
<td>Leaf vegetables</td>
<td>cabbage worm, diamond back moth</td>
<td>25-30ml spray</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Fenvalerate</td>
<td>Fenvalerate</td>
<td>20%emulsifiable concentrate</td>
<td>Leaf vegetables</td>
<td>cabbage worm, diamond back moth</td>
<td>15-40ml spray</td>
<td>3</td>
<td>1</td>
<td>Green vegetable five days in summer, Chinese cabbage 12 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Applicable to:</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>-------------------------</td>
<td>------------------</td>
<td>----------------------</td>
<td>-------</td>
<td>---------</td>
<td>-------</td>
<td>----------------</td>
<td></td>
</tr>
<tr>
<td><strong>Tau - fluvalinate</strong></td>
<td><strong>Mafulike</strong></td>
<td>10% emulsifiable concentrate</td>
<td>Leaf vegetables</td>
<td>cabbage worm</td>
<td>25-50 ml</td>
<td>spray</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td><strong>Methomyl</strong></td>
<td><strong>Lannate</strong></td>
<td>24% soluble fluid</td>
<td>broccoli</td>
<td>cabbage worm</td>
<td>83-100 ml</td>
<td>spray</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td><strong>Phosalone</strong></td>
<td><strong>Phosalone</strong></td>
<td>90% wettable powder</td>
<td>broccoli</td>
<td>cabbage worm</td>
<td>15 - 20g</td>
<td>spray</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td><strong>Phosalone</strong></td>
<td><strong>Phosalone</strong></td>
<td>35% emulsifiable concentrate</td>
<td>Leaf vegetables</td>
<td>diamond back moth, aphid, cabbage worm</td>
<td>130-190 ml</td>
<td>spray</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td><strong>Pirimicarb</strong></td>
<td><strong>Pirimicarb</strong></td>
<td>50% wettable powder</td>
<td>Leaf vegetables</td>
<td>aphid</td>
<td>10-30g</td>
<td>spray</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td><strong>quinalphos</strong></td>
<td><strong>Aikashi</strong></td>
<td>25% emulsifiable concentrate</td>
<td>Leaf vegetables</td>
<td>Prodenia litura, cabbage worm</td>
<td>60-100 ml</td>
<td>spray</td>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td><strong>Teflubenzuron</strong></td>
<td><strong>Teflubenzuron Nomolt</strong></td>
<td>5% emulsifiable concentrate</td>
<td>Leaf vegetables</td>
<td>diamond back moth, cabbage worm</td>
<td>45-60 ml</td>
<td>spray</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td><strong>dichlorphos</strong></td>
<td><strong>dichlorphos</strong></td>
<td>80% emulsifiable concentrate</td>
<td>Leaf vegetables</td>
<td>cabbage worm</td>
<td>100-200 ml</td>
<td>spray</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td><strong>chlorothalonil</strong></td>
<td><strong>chlorothalonil</strong></td>
<td>45% Smoke generator</td>
<td>cucumber</td>
<td>downy mildew</td>
<td>110-180g</td>
<td>smoking</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75% wettable powder</td>
<td>tomato</td>
<td>early epidemic disease</td>
<td>145-270g</td>
<td>spray</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td><strong>copper hydroxide</strong></td>
<td><strong>Kocide</strong></td>
<td>77% wettable powder</td>
<td>tomato</td>
<td>early epidemic disease</td>
<td>134-200g</td>
<td>spray</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>procymidine</strong></td>
<td><strong>procymidine</strong></td>
<td>50% wettable powder</td>
<td>cucumber</td>
<td>gray mold stalk break</td>
<td>40-50g</td>
<td>spray</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>vinclozolin</strong></td>
<td><strong>Ronilon</strong></td>
<td>50% wettable powder</td>
<td>cucumber</td>
<td>gray mold</td>
<td>75-100g</td>
<td>spray</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td><strong>Ketosuccinic acid, ketoglutaric acid, oxalic acid</strong></td>
<td><strong>DT (binary acid copper), DT</strong></td>
<td>30% suspending agent</td>
<td>cucumber</td>
<td>Pseudomonassyringae</td>
<td>150-300ml</td>
<td>spray</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Product Name</td>
<td>Active Ingredients</td>
<td>Formulation</td>
<td>Crop</td>
<td>Disease</td>
<td>Quantity</td>
<td>Application Method</td>
<td>Applications</td>
<td>Remarks</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------</td>
<td>-------------</td>
<td>------</td>
<td>---------</td>
<td>----------</td>
<td>-------------------</td>
<td>--------------</td>
<td>---------</td>
</tr>
<tr>
<td>Metalaxyl + Mancozeb</td>
<td>Metalaxyl Mn-Zn</td>
<td>58% wettable powder</td>
<td>Cucumber</td>
<td>Downy Mildew</td>
<td>75-120g</td>
<td>Spray</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Oxadixyl + Mancozeb</td>
<td>Virus Protection alum</td>
<td>64% wettable powder</td>
<td>Cucumber</td>
<td>Downy Mildew</td>
<td>110-130g</td>
<td>Spray</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Pendimethalin</td>
<td>Shitianbu (Etazine)</td>
<td>33% emulsifiable concentrate</td>
<td>Leaf vegetables</td>
<td>Ephemeral broad leaved and gramineae weed</td>
<td>100-150ml</td>
<td>Soil treatment</td>
<td>1</td>
<td>Before transplant, after soil spray, harrow even</td>
</tr>
<tr>
<td>Nitro Phenolate</td>
<td>Atonik</td>
<td>1.8% aqua</td>
<td>Tomato</td>
<td>Adjust growth</td>
<td>6000-8000 times liquid (2.3-3mg/L)</td>
<td>Spray</td>
<td>2</td>
<td>7</td>
</tr>
</tbody>
</table>
## Attachment Table 3 Suggested fertilizer type of non public hazard vegetable

<table>
<thead>
<tr>
<th>Categorization</th>
<th>Name</th>
<th>Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi supplied</td>
<td>manure</td>
<td>human excrement, livestock and fowl excrement through non hazard treatment</td>
</tr>
<tr>
<td></td>
<td>compost</td>
<td>Formed through piling of all kinds of straws, fallen leaves and human and animal excrement</td>
</tr>
<tr>
<td></td>
<td>rotted manure</td>
<td>Formed through piling of fermentation of raw materials of compost under drowning condition</td>
</tr>
<tr>
<td></td>
<td>farmyard manure</td>
<td>Piled by the excrement of pig, sheep, horse, chicken and duck etc. livestock and fowl and straws</td>
</tr>
<tr>
<td></td>
<td>green manure</td>
<td>Planted or wild green plant body as fertilizer</td>
</tr>
<tr>
<td></td>
<td>methane</td>
<td>methane liquid of residual slag</td>
</tr>
<tr>
<td></td>
<td>Straw</td>
<td>Crop straw</td>
</tr>
<tr>
<td></td>
<td>sludge (used as) manure</td>
<td>Un-polluted river sludge, pond sludge and ditch sludge etc.</td>
</tr>
<tr>
<td></td>
<td>cake fertilizer</td>
<td>Colza cake, cottonseed cake, sesame seed cake and peanut cake etc.</td>
</tr>
<tr>
<td>Commercial</td>
<td>Commercial organic fertilizer</td>
<td>Processed with raw materials of biological substance, animal and plant residual, excrement etc. wastes</td>
</tr>
<tr>
<td>fertilizer</td>
<td>humid fertilizer</td>
<td>Peat , brown coal and weathered coal etc. humud fertilizer</td>
</tr>
<tr>
<td></td>
<td>microbial fertilizer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rhizobium fertilizer</td>
<td>Rhizobium preparation that can form root nodule in bean crops</td>
</tr>
<tr>
<td></td>
<td>Azotobacter fertilizer</td>
<td>Microorganism preparation that contains azotobacter and joint azotobacter</td>
</tr>
<tr>
<td></td>
<td>Phosphobacteria fertilizer</td>
<td>Microorganism preparation that contains phosphobacteria, trimmedoxime epiphyte and mycorrhiza</td>
</tr>
<tr>
<td></td>
<td>Silicate Bacteria Fertilizer</td>
<td>Microorganism preparation that contains Silicate Bacteria, other kalium</td>
</tr>
<tr>
<td></td>
<td>microbial compound fertilizer</td>
<td>Microorganism preparation that contains over two kinds of benign microorganism, and microorganism without mutual rivalry</td>
</tr>
<tr>
<td></td>
<td>Organic and inorganic mixed fertilizer</td>
<td>Fertilizer synthesized by organic and little amount of inorganic fertilizer</td>
</tr>
<tr>
<td></td>
<td>inorganic fertilizer</td>
<td></td>
</tr>
<tr>
<td>Nitrogenous fertilizer</td>
<td>Ammonium nitrogen fertilizer that contains nitrogen, nitrate nitrogen fertilizer, ammonium and nitrate nitrogen, amide nitrogen fertilizer, potash fertilizer and chemical fertilizer that contains potassium</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Phosphate fertilizer</td>
<td>Chemical phosphate fertilizer that contains phosphorus, and ground phosphate rock and semi acid phosphate fertilizer etc.</td>
<td></td>
</tr>
<tr>
<td>Calcium fertilizer</td>
<td>Quicklime, white lime, defecation carbonation that contains calcium and other calcium-containing fertilizer</td>
<td></td>
</tr>
<tr>
<td>Sulfur fertilizer</td>
<td>Chemical fertilizer that contains sulfur and plaster, sulfur etc.</td>
<td></td>
</tr>
<tr>
<td>Magnesium fertilizer</td>
<td>Chemical fertilizer that contains magnesium and lime matters</td>
<td></td>
</tr>
<tr>
<td>Special purpose mixed fertilizer</td>
<td>Through mixing the nitrogen, phosphorus and kalium etc. fertilizer according to soil measurement result and crop needs</td>
<td></td>
</tr>
<tr>
<td>Trace element fertilizer</td>
<td>Prepared fertilizer that contains copper, iron, zinc, boron and molybdenum etc. trace elements</td>
<td></td>
</tr>
<tr>
<td>Leaf surface fertilizer</td>
<td>Fertilizer that contains all kinds of nutrients, not contains chemically synthesized growth regulator, sprayed on the leaves of plants</td>
<td></td>
</tr>
</tbody>
</table>

Attachment table 4  Using standard of nitrogen fertilizer limit in producing vegetable

<table>
<thead>
<tr>
<th>Vegetable type</th>
<th>Pure Nitrogen (kg/mu)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast-growing leaf vegetables</td>
<td>8</td>
<td>Edible rape, lettuce</td>
</tr>
<tr>
<td>Heading leaf vegetables</td>
<td>15</td>
<td>Chinese cabbage, broccoli</td>
</tr>
<tr>
<td>Melon</td>
<td>20</td>
<td>tomato, cucumber, water melon, melon</td>
</tr>
<tr>
<td>Root vegetable</td>
<td>12</td>
<td>Radish, carrot</td>
</tr>
</tbody>
</table>

Notes: The limit standard refers to the application in one growing period, and the application amount each time should be lower than 6kg of pure nitrogen. It is suggested that 50% organic nitrogen and 50% inorganic nitrogen be applied.