World Bank Loan

Gansu Province Implement Sustainable Agriculture Projects Using World Bank Loan

(Pest Management Plan)

Gansu Provincial Agricultural Comprehensive Development Office

October 12, 2012
1. Project Summarize

Gansu Province Implement Sustainable Agriculture Projects Using World Bank Loan purpose lies in the introduce international good agricultural practice to improve agricultural production conditions, raise the ability of agriculture suit and reply climate change realizes agriculture can develop continuously. Project select 21 villages and towns of 6 cities and counties of Dunhuang, Gaotai, Yongdeng, Lintao, Wushan and Lingtai from east to west of Gansu Province, involved infield 33.5 thousand ha². Mainly carried out mainly by supporting the construction of farmland flora and irrigation facilities, agricultural land remediation, soil fertilization infrastructure construction, improve the condition of wheat, potatoes, vegetables, apples, cotton and grapes and other crops production, increase production levels and prevention capacities for disaster reduction. According to the agricultural production of the actual project area, the project implementation process crops, the total sown the same, but an increase in cash crops such as vegetables and fruit area, leading to increased use of pesticides and fertilizers, may be pests and diseases to expand the area, but also lead to a number of new pests and diseases the emergence of the implementation of the project should pay more attention to the application of sustainable agricultural technologies.

According to the requirement of “Pest Management Environment Evaluation OP/BP 4.09” of World Bank and stipulation of “Pest Management” of World Bank and combine agricultural production actual conditions of Gansu Province to establish the sub-project 2.4 “Pest Management Plan (PMP)”. PMP by encouraging farmers to adopt environmentally friendly good agricultural practices and integrated pest management (IPM) technology, provide technical assistance to farmer training, equipment procurement, monitoring and evaluation, and improve the quality of agricultural products and the level of safety. The main focus is as follows.

- The sub-project plan to establish 20-30 demonstration places in project area, Introduction and promotion of IMP technology. Including establish biodiversity monitoring program to protect the use of natural enemies, to strengthen the forecasting of agricultural pests.
- The introduction of the demonstration of bio-pesticides, botanical pesticides instead of chemical pesticides, the highly toxic pesticide use reduce 20%, bio-pesticides increased by more than 15%. so reduce unfavourable influence of chemical pesticide for the environment and personal health.
• Improve the practical skills of farmers through participatory training methods of counselor training, farmer field schools, farmers and mobile training teams, training farmers to master the skills of integrated pest management.

• Offer pesticide store and use training to Project area farmers, raising stipulates knowledge for the use and management of pesticide.

• Offer training for technical persons of technology popularization station, pesticide selasperson and counties (cities) project management office to raise their knowledge for pest management plan (PMP).

• Strengthen contact with the quality and supervision management depart, to ensure demonstration sites compliance with the World Bank for the project-related the requirements (OP/BP4.09) and other international conventions and guidelines.

In order to implement this plan, we will establish province level pest comprehensive prevention and cure supervise group and experts consultation group. Every project county and city will establish city project management office and county project management office. County and village are all arrange special persons to take charge the project implementation and management work.

PMP plan include 5 parts of Project Summarize, Project Background, PMP Integrated Management Plans, PMP Implementation Arrangement, Work Plan and Cost Arrangements. Crops and forest pest control 12.5825 thousand hm2, proposed budget is 8.883 million yuan.

2. Project Background

2.1 Project Target

World Bank loan in Gansu Province sustainable development of agricultural projects focus on high standards of farmland water conservancy facilities-based remediation and water conservancy facilities, supporting the construction, improving agricultural adaptation and response to climate change, sustainable development of agriculture and encourage farmers to adopt good agricultural practices adapted to local conditions to design a set of integrated pest management (IPM) technology portfolios, reduce project implementation may result in the adverse effects of the increased use of pesticides, and improve the quality of agricultural products, the application of pesticides to control the risks to human health and environmental effects at an acceptable minimum level, at the same time ensure a safe environment to ensure sustainable agricultural production and rural incomes and agricultural development.

2.2 Crop Pest and Disease Problems in project County
2.2.1 Agricultural production status of the project counties

Implementation of the six cities (counties) of agricultural production statistics by querying the project, project area food crop acreage is 9556 hm², cash crops is 6308.8 hm², fruit trees 2408.9 hm², food crop, cash crops and fruit ratio is 40:35:25. Food crop major with wheat, corn, potato; cash crops major with vegetables, cotton and canola; fruit trees major with apples, grapes (Table 1).

Table 1 Major Crop Sort and Planting Area in Project Area

<table>
<thead>
<tr>
<th>Project County</th>
<th>Grain Crop</th>
<th>Economic Crop</th>
<th>Fruit Tree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wheat</td>
<td>Corn</td>
<td>Potato</td>
<td>Melon Vegetable</td>
</tr>
<tr>
<td>Dunhuang City</td>
<td>21.0</td>
<td>24.0</td>
<td>/</td>
<td>258.0</td>
</tr>
<tr>
<td>Gaotai County</td>
<td>428.6</td>
<td>1101.6</td>
<td>507.6</td>
<td>326.3</td>
</tr>
<tr>
<td>Yongdeng County</td>
<td>745.2</td>
<td>448.5</td>
<td>638.8</td>
<td>532.3</td>
</tr>
<tr>
<td>Lintao County</td>
<td>832.0</td>
<td>296.0</td>
<td>730.0</td>
<td>526.0</td>
</tr>
<tr>
<td>Wushan County</td>
<td>998.0</td>
<td>439.0</td>
<td>/</td>
<td>1035.0</td>
</tr>
<tr>
<td>Lingtai County</td>
<td>964.5</td>
<td>1199.1</td>
<td>182.5</td>
<td>254.0</td>
</tr>
<tr>
<td>Subtotal</td>
<td>3989.2</td>
<td>3508.1</td>
<td>2058.7</td>
<td>2931.6</td>
</tr>
<tr>
<td>Total</td>
<td>9556</td>
<td>6308.8</td>
<td>2408.9</td>
<td></td>
</tr>
</tbody>
</table>

Project area distributed in 21 villages (towns) of 6 Cities (Counties) of Dunhuang and Gaotai located in Hexi of Gansu Province, Yongdeng and Lintao located in the middle of Gansu Province, Lingtai and Wushan located in the east of Gansu Province. Project area has 49.9 thousand farmers, infield area 33.5 thousand ha., crop planting area 16.2 thousand ha., in which grain crop take 59.0%, economic crop take 41.0%, fruit trees planting 2.4 thousand ha. (Table 2). Farmer per capita between 2685-6880 Yuan and it is 85%-94% of level of project city (county), economic level located middle leaning lower level of project counties. 2 project cities (counties) of Hexi region is the agricultural product major produces district of high quality cotton, corn seeds, melon and vegetable and grape.middle part 2 project areas is the major products district of potato and vegetable, east 2 project areas is the major products district of wheat, corn and vegetable
The project area from east to west order the Loess Plateau rained dry lands in semi, semi-arid areas of the Loess Plateau and arid oasis irrigation area, crop distribution and production methods quite different, but basically one cropping system. Dunhuang main cultivated crops as cotton, grapes, vegetables, Gaotai as corn, wheat, and vegetables and other high-profile, Yongdeng as wheat, vegetables and corn, Lintao as wheat, potatoes and vegetables, the Lingtai as corn, winter wheat, and Apple, Wushan as vegetables, wheat and apple.

**Table 2 Gansu Province Project Area Infield Area and Crop Planting Area (10000 ha.)**

<table>
<thead>
<tr>
<th>Project City (County)</th>
<th>Dunhuang</th>
<th>Gaotai</th>
<th>Yongdeng</th>
<th>Lintao</th>
<th>Wushan</th>
<th>Lingtai</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infield area</td>
<td>0.28</td>
<td>0.29</td>
<td>0.84</td>
<td>0.81</td>
<td>0.35</td>
<td>0.78</td>
</tr>
<tr>
<td>Crop planting area</td>
<td>0.28</td>
<td>0.27</td>
<td>0.26</td>
<td>0.28</td>
<td>0.27</td>
<td>0.26</td>
</tr>
<tr>
<td>(1)Grain crop</td>
<td>0.005</td>
<td>0.21</td>
<td>0.18</td>
<td>0.19</td>
<td>0.14</td>
<td>0.23</td>
</tr>
<tr>
<td>(2)Economic crop</td>
<td>0.27</td>
<td>0.06</td>
<td>0.08</td>
<td>0.09</td>
<td>0.13</td>
<td>0.03</td>
</tr>
<tr>
<td>Fruit tree planting area</td>
<td>0.03</td>
<td>0.04</td>
<td>0.01</td>
<td>0.11</td>
<td>0.05</td>
<td>0.24</td>
</tr>
<tr>
<td>Per capita income (Yuan)</td>
<td>6880</td>
<td>5391</td>
<td>3106</td>
<td>2792</td>
<td>2750</td>
<td>2685</td>
</tr>
<tr>
<td>In which: Planting trade (%)</td>
<td>79.2</td>
<td>58.2</td>
<td>36.4</td>
<td>63.0</td>
<td>32.1</td>
<td>82.1</td>
</tr>
</tbody>
</table>

2.2.2 Agricultural Technical Measure Present Situation of Project Area County

(1) Apply assistance high quality crop new variety. Project area major with 21 villages and towns of 6 counties, farmers purchase fine new variety from local seeds sales organization and market and take disease-resistant kind as the major measure for pest prevention and cure.

But it exist two major problems, one is some variety have no experimentation in project area, farmers purchase only by directions and cause to drop in production. Another is planting kind is relatively unitary, the biology multiformity and heredity multiformity of farmland biogeocenose reduce so cause pest arises.

(2) Apply advance applied advanced practical water high effective management technology consciousness raise continuously, fertilizer and irrigation according to crop requirement, raise water fertilizer utilization rate, the dry area complete support natural precipitation area, universal use covers the fair water technology of preservation of soil
moisture, raises natural precipitation utilization rate. Key application crop measure earth to apply fertilizer, corn whole membrane two ridges ditch fair rain plant and ridge membrane furrow irrigation drip under, cotton membrane to fill, make wine grape facility highyield culture, potato ridge crop planting, vegetable plant without pollution standardization and wheat mechanization working technology etc.

But there have four aspect problems, first is the position rate of advanced technique is still more low, such as establishment vegetable, cotton, seeds corn etc. still major wirh irrigation, film drop irrigation technology application rate is less than 30%; second is high yield care and mid-low yield soil fertilization measure less comparely, soil organism at large fall short of 10%. Third is the farming skill combination of farm machinery is loosely, still major with handwork labour. Foryh is crop farming planting time limit to prolong, soil farming obstacle to compare stick out, pest serious occur, crop reduction of product more than 30%.

(3) Increase agricultural chemical to put in. Large scale popularize and apply of chemical technology and chemistry additive have raised project area crops output level and benifit greatly, have increased agricultural precautions calamities and fight calamities ability.

But chemical put in in large quantities to aggravate agriculture for chemical rely on degree, unreasonable use has brought negative surface effect for environmental and food safety. Such as Gaotai and Dunhuang major establishment vegetable, chemical fertilizer is used excessively, overstep the environmental safe upper limit of international stipulation, fertilizer using rate is fall short of 30%. Pesticide max using has exceed 300kg/ha. In which chemistry fertilizer take over 92%, organic pesticide is fall short of 5%. Infield film use quantity has exceed 15kg/ha. Crop planting filmed, farmland remnant film reclain rate is lower, soil white pollution submit the situation that becomes serious day by day.

2.2.3 Pest types and occurrence

Gansu Province, the annual average crop pests and diseases affected 6.961 million hectares, with an average disaster 3.186 million ha times, the annual loss of 214,300 tons of grain. In year 2010, crop pests and diseases in the province cumulative area of 8.533 million hectares. It is estimated that the normal year of Gansu Province due to pests and diseases food production more than 15%, 15% to 20% of the cotton, oil, about 30% of fruits and vegetables.

2.2.3.1 Constitue a major crop pests and diseases

Investigations and studies of the project area, the major crop pests in the project area are as follows (Table 3)
<table>
<thead>
<tr>
<th>Crops</th>
<th>Common Pests</th>
<th>Common Diseases</th>
<th>Commonly Used Fungicides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>Soil pests, aphids, armyworms, spider mites, midge</td>
<td>Stripe rust, powdery mildew, all disease and root rot</td>
<td>Phoxim, chlorpyrifos, pyridine acetamiprid; triadimefon, tebuconazole, propiconazole yl, etc</td>
</tr>
<tr>
<td>Corn</td>
<td>Soil pests, corn borer, cotton bollworm, aphids, red spider</td>
<td>Tumor, maize head smut, smut and ear rot and stem rot, bacterial wilt, and size of the spot disease</td>
<td>Phoxim, chlorpyrifos, acetamiprid, cyhalothrin, thiacloprid; propiconazole, tebuconazole, and gene seed coating</td>
</tr>
<tr>
<td>Cotton</td>
<td>Cotton aphid, spider mite of cotton, the cotton bollworm, yellow and black cutworm</td>
<td>Cotton verticillium wilt, fusarium wilt</td>
<td>Phoxim, profenofos, abamectin, pyridaben, chlorpyrifos, cypermethrin etc.</td>
</tr>
<tr>
<td>Potato</td>
<td>Soil pests, aphids, leaf beetles</td>
<td>Late blight, early blight, ring rot, black shank, scab, basal stem rot (mole disease, Rhizoctonia solani), viral diseases</td>
<td>Phoxim, chlorpyrifos, acetamiprid, imidacloprid; hydroxide, cymoxanil Mn, Zn, evil cream Spirit MnZn, mancozeb, metalaxyl MZ, tebuconazole alcohol</td>
</tr>
<tr>
<td>Mellon and vegetable</td>
<td>Soil pests, the diamondback moth, cabbage caterpillar, aphids, leafminers, whitefly</td>
<td>Downy mildew, gray mold, anthracnose, blight, powdery mildew, viral diseases, verticillium wilt, fusarium wilt, root knot nematode</td>
<td>Phoxim, chlorpyrifos, abamectin, spinosad, deltamethrin, thiophanate methyl, carbendazim, chlorothalonil, mancozeb, cymoxanil Mn, Zn, downy mildew Wei, The enoyl morpholine, Fosetyl aluminum, multi-sulfur suspension, the alkene. hydroxyl morpholine guanidine, streptomycin, hydroxide, pyrimethanil, different bacteria urea</td>
</tr>
<tr>
<td>Apple</td>
<td>Borer, spider mites, aphids, pear psylla, scale insects, leaf roller, codling moth</td>
<td>Rot disease, powdery mildew, mosaic virus, anthrax, leaves disease</td>
<td>Chlorpyrifos, acetamiprid, avermectin, fenvalerate, propargite, thiophanate-methyl, calcium polysulfide, carbendazim, mancozeb, rot must be clear, tebuconazole, propiconazole yl, etc</td>
</tr>
<tr>
<td>Grape</td>
<td>Grape gall mite, mites, Kuwana, whitefly class</td>
<td>Powdery mildew, downy mildew, anthracnose and gray mold</td>
<td>Chlorpyrifos, phoxim, avermectin, fenvalerate, thiophanate-methyl, mancozeb, triadimefon, propiconazole yl</td>
</tr>
<tr>
<td>Flax</td>
<td>Short grain Meyrick, rape flea beetle and soil pests</td>
<td>Fusarium wilt and Sclerotinia sclerotiorum, downy mildew, powdery</td>
<td>Imidacloprid, thiacloprid, acetamiprid, chlorpyrifos; triadimefon, multi-sulfur suspension</td>
</tr>
</tbody>
</table>
Through surveys and household interviews that most of the project area farmers and local agricultural technology extension workers are not familiar with the pests and diseases on vegetables and fruit trees, can not correctly identify the pests, and lack of experience in prevention and treatment, generally reflect vegetables and fruit tree pests and diseases prevention is very difficult. Due to the economic value of vegetables and fruit products than food crops, vegetables and fruit tree pests and diseases caused by the loss of often higher than that of food crops.

2.2.4.2 The characteristics and causes of major crop pests and diseases
(1) The major crop pests and diseases characteristics
First is occurrence area large and wide range, disease yield loss is more important than the pest. The main diseases and pests in the crop production in the project area, especially the Hexi wheat root rot, maize tumor smut, cotton blight, grape downy mildew and powdery mildew in the eastern wheat rust, late blight of potato, corn and size of the spot diseases, Phytophthora capsici and powdery mildew, fusarium wilt of cucurbits, cucumber downy mildew and virus diseases, tomato basal stem rot and powdery mildew are all constant-onset disease. Overall, the pest occurrence area is greater than the disease, disease caused by the loss is greater than the pest.

Second is popular fast and serious damage. Such as tomato blight sooner or later the whole field from sporadic to spread only a half or so, melon powdery mildew is only about one week. In pest and disease outbreaks Year, maize top rot and tumor smut, tomato powdery mildew, stalk rot of tomato, cotton bollworm fierce and the harm suffered serious losses. Such as the Gaotai County tomato powdery mildew incidence on average 24.6%, up 60.7%; corn crazy top disease incidence of 18.6% up to 53.2%. The Protected Cultivation disease epidemics speed faster, and can cause damage in a short period of time. Such as cucumber downy mildew spot film occurred only 5-7 days to spread the whole shed, greenhouse cucumber production loss is 10% to 20%, the incidence of serious loss more than 50%. Solanaceous vegetables in the project area, almost all varieties virus disease hazards, vegetables blight, gray mold popular each year, aphids, whitefly is still serious.

Third is the damage long period and large losses. Project area facilities for the rapid development of agriculture and the ecological conditions in the facility are very suitable for pests and diseases damage, increased pest damage term. Field crops after harvest, some
pests migrate to the greenhouse whitefly, pest Liriomyza sativae generations increased and overlapping generations in greenhouse seasonal conventional cultivation becomes anniversary occurred. The occurrence of some pests and diseases season than open field cultivation significantly in advance, such as the growth of cucumber downy mildew mainly to advance to the seedling stage became popular in the late onset. Cucumber scab, pepper and tomato powdery mildew, Liriomyza sativae in recent years passed in serious harm prevention difficult.

Forth is Include a wide variety of pests. ①The main pest is still rampant. Such as field corn spider mites, cotton aphids, corn aneurysm black powder, tomato early blight infestation is rampant; cucumber downy mildew, pepper powdery mildew, tomato early blight, greenhouse whitefly, Liriomyza sativae still serious damage, if prevention does not timely or improper control methods often cause serious damage. ② Secondary pest rise as a major pest. As the dew processing The tomato blight Occurrence lighter sooner or later, has now become the main diseases affect the development of the processing tomato industry; cucumber, eggplant, tomato gray mold does not occur in the open field cultivation or Occurrence lighter in greenhouse cultivation heavy infestation, prevention and treatment difficult. ③ Soil-borne diseases is getting worse. Processing tomato stalk rot, melons wilt, Phytophthora capsici and other soil-borne diseases was heavier occur trend; cucumber, tomato damping-off disease and extend the greenhouse cultivation years, the occurrence and damage has been increasing. ④ New worm is emerging. With the introduction of new varieties, the number of new pests and diseases continue to emerge and intrusion harm, such as seed corn on newly discovered maize top rot, root-knot nematode disease and other expanded year by year. ⑤ Physiological diseases can not be ignored. The unreasonable improper fertilization and cultivation, physiological diseases have occurred.

(2) The main crop pests and diseases aggravated reasons

First is cultivation environmental conditions conducive to pests and diseases. The project area vigorously develop cash crops such as vegetables and fruits, single crop species, farmland biome tends to single bacteria pathogenic variation speed up to speed up the rate of loss of resistant varieties even popular occurred. The mulching project area and greenhouse cultivation technology applications have provided favorable conditions for the occurrence of pests and diseases spread. A considerable part of the farmers in the project area indiscriminate use of fertilizer or with a lot of fat and lead to disease, pests occur resulting in cuts.

Second is prevention and treatment methods and prevention measures are not in place. The project area they usually focus on pest control chemical control light phenomenon of other preventive measures, chemical control blind medication, medication of a single species, free to increase the amount of other issues, leading to the prevention and treatment ineffective.
Third is the crop varieties update is one reason of pest change. Generally speak on the choice of crop varieties to select superior varieties, a fine variety not only to adaptability, high yield, good quality, and stress resistance is stronger and different varieties resistant occurrence of disease prevalence. In many cases, the resistance of crop varieties is the dominant factor in determining pest popular

Forth is warming exacerbated by pests and diseases. Since the 1980s, in the context of global warming, climate, the province's meteorological disasters showing a rising trend, the frequent occurrence of extreme weather events, the project area the same rising temperatures and reduced precipitation, an increase in severe weather events. Warming favor pests and pathogens security of the project area for the winter, and the occurrence of crop pests and diseases from generation to generation, wintering northern boundary of the distribution has changed, pests and diseases in the area showed a year-on-year growth trend, the degree of harm and frequency.

2.2.4.3 The project counties worms harm caused by the loss

Enquiry statistical summary, although farmers each year for pest control for a very good effort, but the loss is still not small. In year 2011, Lingtai County lost 2.467 million kg of wheat, Gaotai County lost 1.67 million kg of corn, four counties of Gaotai, Lintai, Wushan and Lingtai lost 1.7-2.2 million kg of vegetables.

Table 4 The project counties major crop pests annual loss (10000 kg)

<table>
<thead>
<tr>
<th>Project County</th>
<th>Food crops</th>
<th>Economic crops</th>
<th>Fruit trees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wheat</td>
<td>Corn</td>
<td>Potato</td>
</tr>
<tr>
<td>Dunhuang</td>
<td>0.10</td>
<td>0.20</td>
<td>/</td>
</tr>
<tr>
<td>Gaotai</td>
<td>17.50</td>
<td>167.00</td>
<td>9.50</td>
</tr>
<tr>
<td>Yongdeng</td>
<td>29.20</td>
<td>1.80</td>
<td>5.63</td>
</tr>
<tr>
<td>Lintao</td>
<td>3.20</td>
<td>19.95</td>
<td>18.09</td>
</tr>
<tr>
<td>Wushan</td>
<td>48.40</td>
<td>1.20</td>
<td>12.0</td>
</tr>
<tr>
<td>Lingtai</td>
<td>246.70</td>
<td>124.60</td>
<td>98.00</td>
</tr>
</tbody>
</table>

2.3 Chemical Pesticide Use in the Current Situation

2.3.1 Chemical pesticides investment

The project area crop pest control is mainly dependent on the pesticide chemical pesticides. Rural areas of Gansu Province, according to the 2008 Statistical Yearbook data, the use of pesticides in the province of 39,253.7 tons, arable average 8-10kg/hm², which pesticides account for about 65%, fungicides accounted for about 25%, herbicides accounted for about 10%. Six project counties farmers survey annually agricultural production and application of chemical pesticide use was 714.94 ton, including pesticides accounted for 67.4%, fungicides 31.9% and 8.3% of bio-pesticides (Table 5).
Table 5 Annual sales of the project counties pesticides (ton)

<table>
<thead>
<tr>
<th>Types of pesticides</th>
<th>Project County</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dunhuang</td>
<td>Gaotai</td>
</tr>
<tr>
<td>Organic phosphorus</td>
<td>69.44</td>
<td>6.57</td>
</tr>
<tr>
<td>Organochlorines</td>
<td>1.56</td>
<td>0.00</td>
</tr>
<tr>
<td>Carbamate</td>
<td>0.27</td>
<td>0.01</td>
</tr>
<tr>
<td>Permethrin</td>
<td>0.14</td>
<td>13.90</td>
</tr>
<tr>
<td>Fungicides</td>
<td>27.15</td>
<td>1.73</td>
</tr>
<tr>
<td>Pesticides</td>
<td>36.45</td>
<td>18.40</td>
</tr>
<tr>
<td>Biological fungicide</td>
<td>4.57</td>
<td>1.00</td>
</tr>
<tr>
<td>Biopesticides</td>
<td>12.50</td>
<td>0.10</td>
</tr>
<tr>
<td>Total</td>
<td>152.07</td>
<td>41.71</td>
</tr>
</tbody>
</table>

Omethoate, highly toxic pesticides such as methyl 1605, dicofol pesticide use, most of the farmers, that is, pay attention to pest control, neglect of medical treatment, the general lack of disease prevention and control knowledge with farmers. Once the pests and diseases, the the farmers choose pesticides or fungicides possibility of more than 80%. Up to 70% the proportion of highly toxic pesticides in the use of pesticides in use of biological pesticides farmers. In the spraying device, more conventional sprayer, substantially no ultra low volume sprayers, reducing the utilization of the pesticide, an increase of pesticides on the environment pollution.

Project area crops pesticide use quantity (Table 5) have more difference, conservatory vegetable use quantity is large and reach 30 kg/ha., in the next place is reveal land vegetable, 20 kg/ha., wheat and corn use quantity are all about 5 kg.

Table 6 Major Crops Pesticide Use Variety and Quantity

<table>
<thead>
<tr>
<th>Crop</th>
<th>Use Feasibility</th>
<th>Quantity (kg/hm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Insecticide</td>
<td>Antiseptic</td>
</tr>
<tr>
<td>Wheat</td>
<td>90%</td>
<td>80%</td>
</tr>
<tr>
<td>Corn</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>Cotton</td>
<td>80%</td>
<td>50%</td>
</tr>
<tr>
<td>Oil plant</td>
<td>50%</td>
<td>100%</td>
</tr>
<tr>
<td>Reveal land vegetable</td>
<td>90%</td>
<td>100%</td>
</tr>
</tbody>
</table>
2.3.2 The attitude of farmers on chemical pesticides

We learned from the household interviews (Table 7). The vast majority of farmers still lack of environmental protection and health protection awareness, there has been some poisoning stories. For quality issues, most of the farmers interviewed at a loss for chemical pesticides ads confusion, do not know how to select the right of pesticide varieties and use effectively target pest, especially when some of the new varieties of pesticides, more It is a loss. Often exceed the amount of the manual describes the use of pesticides to use, does not understand and pesticide different mode of action, do not understand the dangers of pesticides on the environment. If a pesticide to a pest better control effect, they will think that the pesticides have the same effect on all pests. All surveyed farmers are eager to organize more training courses, on-site meetings, release or recommend the latest technical information and pesticide products, in order to resolve the various practical problems faced by their production, and requires a demonstration model fieldshow the effect of new technologies, new products in the form of radiation and promote the development of a large area of promotion.

Table 7  Project area farmers interviews dialogue content

<table>
<thead>
<tr>
<th>No.</th>
<th>Content</th>
<th>Problem of design and choose a single number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>1</td>
<td>Medication useful life</td>
<td>2-5</td>
</tr>
<tr>
<td>2</td>
<td>Know 3 Certificates</td>
<td>Know</td>
</tr>
<tr>
<td>3</td>
<td>How to get the drug</td>
<td>Pesticide shop</td>
</tr>
<tr>
<td>4</td>
<td>How to choose the drug</td>
<td>Agricultural officers recommended</td>
</tr>
<tr>
<td>5</td>
<td>How to determine the medication time</td>
<td>Experience (notice)</td>
</tr>
<tr>
<td>6</td>
<td>Pesticide use</td>
<td>Experience</td>
</tr>
<tr>
<td>7</td>
<td>How to weighed pesticide</td>
<td>Medicine bottle</td>
</tr>
<tr>
<td>8</td>
<td>Actual dose</td>
<td>Tags dose range</td>
</tr>
</tbody>
</table>
### How to calculate the amount of medication

<p>| | | | | | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>9</td>
<td>How to calculate the amount of medication</td>
<td>g/mu</td>
<td>41</td>
<td>Dilution factor</td>
<td>22</td>
</tr>
</tbody>
</table>

#### How to determine the number of drugs

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</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
<td>Experience</td>
<td>16</td>
<td>As recommended</td>
<td>19</td>
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</tbody>
</table>

#### Quarterly crops medication times

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>11</td>
<td>Quarterlies crops medication times</td>
<td>1-2 times</td>
<td>15</td>
<td>3-4 times</td>
<td>27</td>
</tr>
</tbody>
</table>

#### Each dose interval

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</thead>
<tbody>
<tr>
<td>12</td>
<td>Each dose interval</td>
<td>Over 8 days</td>
<td>30</td>
<td>6-7 days</td>
<td>18</td>
</tr>
</tbody>
</table>

#### Medication safety interval

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</thead>
<tbody>
<tr>
<td>13</td>
<td>Medication safety interval</td>
<td>For implementation</td>
<td>16</td>
<td>No executed</td>
<td>11</td>
</tr>
</tbody>
</table>

#### How to medication

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</thead>
<tbody>
<tr>
<td>14</td>
<td>How to medication.</td>
<td>One at a time</td>
<td>21</td>
<td>Two kinds mixed</td>
<td>10</td>
</tr>
</tbody>
</table>

#### Impact weather on medication

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>15</td>
<td>Impact weather on medication</td>
<td>Rain</td>
<td>46</td>
<td>The wind is strong</td>
<td>27</td>
</tr>
</tbody>
</table>

#### Whether protection when spraying

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<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Whether protection when spraying</td>
<td>Wear a mask</td>
<td>21</td>
<td>Wear a mask, wear protective clothing</td>
<td>28</td>
</tr>
</tbody>
</table>

#### Pesticide poisoning

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</thead>
<tbody>
<tr>
<td>17</td>
<td>Pesticide poisoning</td>
<td>Sent to the hospital</td>
<td>22</td>
<td>The tabbed Hospital</td>
<td>29</td>
</tr>
</tbody>
</table>

#### Pesticides saved

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<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Pesticides saved</td>
<td>Classified storage</td>
<td>31</td>
<td>Casually placed</td>
<td>19</td>
</tr>
</tbody>
</table>

#### Empty bottles

<p>| | | | | | |</p>
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<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>Empty bottles</td>
<td>Lost in Tanabe</td>
<td>14</td>
<td>Burned or buried</td>
<td>33</td>
</tr>
</tbody>
</table>

#### Knowledge training

<p>| | | | | | |</p>
<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Knowledge training</td>
<td>None</td>
<td>7</td>
<td>1-2 times</td>
<td>25</td>
</tr>
</tbody>
</table>

### 2.4 Crop Pest and Disease Management and Existing Problems

The economic development of the project area is in the middle and lower level of the project counties, pest and disease control area accounted for about 80% of the sown area of crops, pest and disease control is a relatively low level. The great difference between the highest project area, Dunhuang, Gaotai in the project area reach 91% -99%, while the rest of the county is in the range of 70-80%. Summed up in the pest control measures mainly agricultural measures, physical and mechanical, biological, ecological control and chemical control (Table 8). Chemical control in the prevention measures still effective control of the main body of the pests and diseases, accounting for more than 80%, the agricultural measures accounted for about 10%, 5% each control and biological control of the physical and mechanical.

#### 2.4.1 Integrated pest management
In pest control in the project area farmers fully understand the selection and application of resistant varieties, crop rotation, rotation of crops and other agricultural measures pest control measures, Chucierwai is dependent on chemical pesticides to control, biological control, physical control methods such as the use of less. When there are disease and pest occurs using pesticides pests to kill the disease is brought under control with pesticides, and give priority to productivity and profitability, As for pesticide residues can not see, touch or yet to pay attention to, only in the event of residual hazards and Noting that the rational use of drugs causing livestock poisoning.  

Project area most farmers lack the necessary integrated pest management techniques to master the technology of controlling pests in biological control, ecological control, physical control harmful, and scientific medicine is very weak, only a small number of farmers to understand the concept of integrated pest management (IPM), but does not know the the IPM technology system and work procedures. Urgent need to strengthen the farmers to carry out biological control, ecological control, physical Nourishing and booby traps technical training, to maximize alternative and compression use of chemical pesticides.

### Table 8    The project area is mainly used pest control measures

<table>
<thead>
<tr>
<th>Agricultural practices</th>
<th>Prevention and control measures</th>
<th>Suitable crops</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Selection of anti-pest species, seedlings</td>
<td>Suitable for all types of crops</td>
</tr>
<tr>
<td></td>
<td>Plastic mulching</td>
<td>Corn, potato, vegetables, cotton</td>
</tr>
<tr>
<td></td>
<td>Crop rotation</td>
<td>Suitable for all types of crops</td>
</tr>
<tr>
<td></td>
<td>Clean the garden</td>
<td>Fruit trees and vegetables</td>
</tr>
<tr>
<td></td>
<td>Seed potato virus-free</td>
<td>Potato</td>
</tr>
<tr>
<td></td>
<td>Cotton fields planted around the trap corn</td>
<td>Cotton</td>
</tr>
<tr>
<td>Physical control</td>
<td>Light, sweet and sour liquid set attracting insects, attracting insects flying the yellow plate</td>
<td>Fruit trees and vegetables</td>
</tr>
<tr>
<td></td>
<td>The high temperature the soaking sterilization insecticide, stuffy studio summer temperatures</td>
<td>Vegetables</td>
</tr>
<tr>
<td>Ecological control</td>
<td>Regulation shelf at room temperature and humidity</td>
<td>Facilities for vegetable cultivation</td>
</tr>
<tr>
<td>Biological Control</td>
<td>Protection, use of natural enemies</td>
<td>Suitable for all types of crops</td>
</tr>
<tr>
<td></td>
<td>Pest control, and the use of biological agents</td>
<td>Vegetables, fruit trees, medicinal herbs</td>
</tr>
<tr>
<td>Chemical control</td>
<td>Seed dressing or seed coating</td>
<td>Wheat, corn, oilseeds, cotton</td>
</tr>
<tr>
<td></td>
<td>Planting trench (hole) medication applicator</td>
<td>Corn, potato, vegetables, canola</td>
</tr>
<tr>
<td></td>
<td>Made of various types of baits to kill pests</td>
<td>Suitable for all types of crops</td>
</tr>
<tr>
<td></td>
<td>Aerosols smoked to kill pests</td>
<td>Facilities vegetables</td>
</tr>
<tr>
<td></td>
<td>Ground spray, or underground irrigating roots</td>
<td>Suitable for all types of crops</td>
</tr>
</tbody>
</table>

### 2.4.2 Agricultural control measures
Selection of resistant varieties. Resistant to insect pests species to control crop pests and diseases is the most effective, and one of the measures of the economy and ease of rows, seed application rate of 85%. Agricultural measures to control for many difficult to use, but the lack of effective pesticides diseases.

Crop rotation. Farmers generally believe even as trigger and aggravate pest damage is an important reason to play the role of deterioration in their nutritional condition, the rotation of a variety of diseases and feeding specificity or mere pests, which can effectively prevent the spread of these diseases and insect pests, The rotation of food crops and cash crops, vegetables class with solanaceous crop rotation, eggplant and leafy crop rotation to reduce pest damage.

Water-saving technologies. The farmers basically mastered the sky, look to see Miao irrigation, to avoid flood irrigation field humidity at big lead to the occurrence of disease.

Remove diseased plants. Strengthen field management, timely removal of pest foliage, fruit or diseased plants, with Tian outside concentrate buried or burned, and reduce the infection source of harm.

2.4.3 Chemical control methods

The farmers in the project area in the past no matter what the pest with dimethoate, dichlorvos, pyrethroid pesticides, even water Isocarbophos, methamidophos toxic pesticides; vegetables one occurrence of the disease, with carbendazim or no effect on thiophanate. The project County Facilities vegetables average pesticide use 30kg / ha, a small number of farmers high up to 120kg / mu the greenhouse cucumber Rogor, kung fu, dichlorvos, thiophanate-methyl, chlorothalonil and other pesticides residues. Typical (Zhangye) survey, high share of highly toxic pesticides in the embarrassing situation, the project area in the pesticide market the pesticide market pesticides proportion, the high proportion of organophosphorus pesticides pesticides pesticides, organophosphorus pesticides in Aamine phosphorus, omethoate such toxic, highly toxic pesticides higher. On the prevalence of the pest control insect No pest use of methamidophos or omethoate phenomenon.

2.4.4 Prevention low degree of technical specifications

Crop pest and disease control has a control period, the applicable period medication, less medication, good effect, low-cost, but the majority of farmers’ random drug serious the arbitrary increase in the number of drugs to control cost increases. As can be seen from the survey: to application Isocarbophos dicofol such toxic, high residue of pesticides used in the prevention and treatment of insect pest of cowpea, eggplant, peppers and other serious vegetable varieties; treatment, number of year generally 8-10 times, acres prevention costs RMB 100 Yuan one year. Up to 20 times the number of medication in greenhouse
cucumber in the whole growth period, in cucumber yield formation peak of spraying once every 2 to 3 days, even one day intervals spraying pesticides 1 to 2 kinds.

2.4.5 The main problems in the pest management

The farmers low quality, lack of technical guidance, the blind application of pesticides. First, the use of insurance medicine. Whether or not the worms, every few days, regular spraying, and labor costs drugs, high cost; "belated" drug. Disease prevention and control advocates focusing on prevention, early prevention, but farmers Juji light anti take more saw very serious disease when it is to fight drugs for the prevention and treatment of diseases; Fungicides wrong way. Agent for prevention and treatment of viral diseases, if any, to prevent verticillium wilt, some worming medicine go disease prevention.

Lack of conventional technical guidance, most farmers only in accordance with the recommendations of the pesticide dealers to solve pest problems they face, and the guiding principles of pesticide dealers farmers are driven out of interest, rather than how efficient low-input and low-pollutionpest control. Not mastered pests and diseases and the control period, farmers can not be scheduled to fight drugs to control pests and diseases

Large amount of highly toxic pesticides. Welcomed by farmers, and are willing to use the highly toxic organophosphate pesticide varieties of production capacity, lower cost, better. But especially to farmers' lack of scientific knowledge, a lack of understanding of the various pesticides, the pesticide use excessive abusive situation is more serious, especially in the extensive use of highly toxic pesticides in vegetables, fruits and other cash crops. Considerable number of people allowed to prohibit the use of the relevant provisions of what pesticides do not know what pesticides Therefore, regardless of the high toxicity and low toxicity, what medicine is cheap, effective on the use.

Single mode of administration, the lack of knowledge of pesticide contamination. Mainly based, accounting for more than 85% of the number of total pesticide spraying pesticide use efficiency is very low. Farmers of highly toxic pesticides cause acute poisoning or lack of knowledge, do not recognize the fundamental cause chronic poisoning dangers of pesticides gradually accumulate in the human body. Some farmers sense of law, motivated by profit and illegal abuse of highly toxic pesticides.

Farmers on new pesticides, biological pesticides to accept slower. First, biological pesticides and chemical pesticides contrast quick result to lose some farmers considered ineffective. Farmers always want to do not understand the new pesticides in price slightly higher than the old pesticides, but Lim Ming expensive dark truth (new pesticides are generally efficient, long duration, can reduce the frequency of administration, cost reduction).

Pesticide mismanagement. Lax monitoring and management of the pesticide market, some regulations can not play curried role, the use of highly toxic banned in vegetables and fruit trees, high pesticide residues farmers continues to use, and is used to control most
pests and diseases pesticide varieties; does not reasonable custody of pesticides and other agricultural chemicals; pesticide waste and packaging is not properly treated.

Comprehensive analysis of the project area, the following problems in the use of chemical pesticides.
(1) The high degree of dependence on chemical pesticides and more prominent, especially in high value goods, better economic benefits of vegetables, melons, fruits and cash crops.
(2) Chemical pesticides, especially in the dose of pesticide use have increased yearly.
(3) Lack of proper use and management of chemical pesticides and other agricultural chemicals.
(4) Dispose of the residual chemical pesticides and waste packaging, there is pollution and poisoning hazards.
(5) Agencies to promote awareness of the integrated pest management, pesticide dealers and farmers is not enough.
(6) The traditional training can not solve specific production problems of individual farmers and emerging challenges.
(7) The lack of timely and adequate information on chemical pesticides

The above problem can be attributed to:

a. Weak implementation of policies and regulations
b. The farmers' lack of knowledge of pest management, improper pest control measures
c. Lack of awareness of environmental protection, abuse, indiscriminate use of pesticides phenomenon seriously.
d. Farmers and grassroots extension workers lack of timely and adequate information.
e. Prevention philosophy behind the idea of crop Fitness cultivated throughout to prevent the practice of crop pests, lack of pest management in accordance with the view of the ecosystem.
f. Ineffective market regulation of pesticides, pesticide management entities, small-scale and informal, purchase channels, the pesticide market order is a bit confusing, the pesticide dealers professional quality is generally low, due to the use of pesticides improper pesticide residues caused agricultural products quality and safety incidents have occurred.
g. Capacity building system is not perfect, the crops pest control technology training work backward. Farmers mainly rely on the guidance of pesticide dealers and pest control, the introduction of advanced monitoring and control techniques, demonstration to promote and organize training measures are not perfect, the agricultural pest risk level of awareness is not enough, not agricultural pest Real-time monitoring and early warning.
2.5 Risk Assessment that May Arise after the Implementation of the Project

To create favorable conditions for the implementation of the project has greatly improved the conditions of irrigation and water conservancy, good water and fertilizer management technology implementation, the incidence of pests and diseases, the same time as the adjustment of planting structure, crop acreage remains unchanged, but vegetables, potatoes, grapes, cotton and high yield and efficiency of corn and other crop acreage increased, leading to increased use of pesticides, predict pest may occur following changes.

2.5.1 Wheat, corn, potatoes, and other pests and diseases change

After the implementation of the project, the wheat soil pests, aphids, spider mites, midge and wheat root disease, wheat virus disease will reduce the extent of its occurrence; wheat stripe rust continues to occupy the the wheat pest absolute dominance. In addition, due to the improvement of the irrigation conditions, the increase in wheat seeding rate, increasing density, lead Catcher climate change, may increase the incidence area of wheat powdery mildew. Maize virus disease, size corn leaf blight and maize head smut smut and corn farming tumor will be eased, but due to the expansion of the area of mulch corn wireworms and cutworms serious maize top rot and corn leaf distortions may further increase the occurrence area, new diseases will appear.

Occurred due to the promotion of virus-free seed potato virus disease will be significantly reduced. But late blight still heavier, ring rot, black shank, soft rot may have increased, the storage period of dry rot outbreak, resulting in a large number of late-maturing young cellaring virus-free seed potato rot, especially with the increase of potato continuous cropping, continuous cropping obstacles due to disease aggravation.

2.5.2 Changes of vegetable pests

All kinds continue to introduce new varieties and year after planting, some foreign pest invasion, based soil-borne diseases such as various types of root rot, blight and wilt be pathogenic accumulated in cruciferous vegetables serious outbreak; Solanaceae vegetables early blight, late blight and gray mold, melons and vegetables Cucurbitaceae wilt, downy mildew, powdery mildew and nematodes continue perennial occurrence and damage. Area under continuous cropping of vegetables the obstacle has increasingly become a concern in vegetable production. At the same time due to the intensive and extensive use of nitrogen fertilizer will lead to further serious occurrence of vegetable pests. In addition, the frequency of frost damage and physiological disorders caused by early spring low temperature will increase.

2.5.3 Pest of cotton and oilseeds change

Cotton aphids, cotton spider mites and bollworm due to the implementation of the project will be effectively controlled, while cotton wilt disease and verticillium wilt
prevention difficult, the damage will continue to occur. Past the more serious flax wilt and flax short grain Tortricidae some relief, Sclerotinia sclerotiorum and oilseed rape powdery mildew under control, but the area of the seedling stage of spring rape rape flea beetle and soil pests will be a serious outbreak.

2.5.4 Orchard pest of change

Be effectively controlled through the implementation of the project and the training of farmers, the grape powdery mildew, gray mold, downy mildew and white rot, but it should be noted that the spread of downy mildew and white rot disease. Jujube jujube geometrid (jujube Steps) the dates Carposina (jujube maggots), dates rust, jujube tin disease and fruit shrink disease control, but should be noted that due to changes in environmental conditions and different configurations of the surrounding crops Zaoyuan strengthen the leafminer and fresh leafy Lepidoptera pests monitoring.

2.5.5 Change of forest pests and diseases

The roadside and farmland surrounding the implementation of the project to be some the plantation economic forest and farmland shelterbelts planted farmland shelter forest trees forest and shrub forest, shelter forest furnished with water-saving projects, farmland engineering and field roads combined, especially those located in the Hexi the Dunhuang project area, high and Wuwei city and county, the farmland shelterbelts development area, area will expand forest pests and diseases. General forest pests and diseases will not produce new types of pests and diseases will not be very serious.

2.5.6 The increase in chemical inputs may increase the risk of various forms of pollution

According to analysis, the implementation of the project to expand the area of vegetables and other cash crops, continue application of pest control measures without using IPM methods, the project area, the use of pesticides each year will be increased by 20%, 15% increase in fertilizer use, mulch the increased use of 10%. Therefore, the project areas to solve the potential problem of pesticide contamination, we must adopt IPM strategies for pest and disease control, it is necessary to change the chemical fertilizer technology to improve the utilization rate of fertilizer, it is necessary screening using degradable film.

2.6 Assessment of Existing Policies and Systems

2.6.1 Existing policies and systems

During the course of pest management plan, concerned relevant policy and regulations have included national layer surface and local layer surface, at the same time, still have
world bank relevant policy. In order to strengthen pest prevention and cure work, Chinese government and Gansu Province people's government work out policies and regulations as follows.


(2) *Pesticide Management Statute of PRC* (Issued by State Department, put in force in May 8, 1997, revised in Nov. 29, 2001)


(4) *Manage Method without Pollution Agricultural Products* (Issued by Ministry of Agriculture, Quality Inspection Quarantine Bureau in 2002)


(6) *Pesticide Safety Use Standard* GB4285-84 and *Pesticide Use in Reason Rule* (GB/T8321.1-GB/T8321.7). Make regulation for use quantity, use times, safety space period, mix remain limit and use notice items of crops.

(7) *Agricultural Products Quality and Safety Regulations of Gansu Province*, Gansu Province, the Standing Committee of the NPC, Nov. 2008

(8) *Anti-virus Procedures of Pesticide Storage, Sale and Use*, ( GB 12475-2006 ) Ministry of Agriculture

Through the enforcement of these standard and norm, in our country have established pesticide research, produce, application, inspection and management service system. Especially State Department issued *Pesticide Management Statute of PRC* in may 8, 1997, it is the first have law effectiveness pesticide management administrative law, it marked Chinese management of pesticide have steped into standardize, legal system and internationalization orbit, also marked Chinese management regulations of pesticide have formed. In jan. 2008, castigatory *Implementation Method of Pesticide Management Statute of PRC* have taken good guarantee role for *Pesticide Management Statute of PRC* implemention enforcement smoothly.

Within the ten security polices of World Bank, applicable to the evaluation have "OP/BP4.09" Pest Management
In our implementation of relevant policies, the project County plant Integrated Pest Management (IMP) initial propulsion.

2.6.2 Current Plant Protection Policy

Chinese government pays attention to emphasize the policy of plant diseases of prevention and cure that adopts "mainly with prevention, scientific defence and control, administers according to law, promotes health" very much for the work of plant pest prevention and cure, in the future will adopt with the method of prevention and cure mainly with biological prevention and cure step by step.

The purpose of government policy aims at control the density of plant pest (point at harm level) in low level, raise the safe level and output of agricultural products. Its purpose is also to protect agricultural resource and protect ecological environment. When plant pest serious occur also use the other methods of prevention and cure can not control efficiently, it is the indispensible method of prevention and cure that application chemical pesticide carries out prevention and cure can use efficient low poison, carry out prevention and cure without pollution chemical pesticide.

The crops prevention and cure of plant pest should be followed with the policy of prevented mainly, comprehensive prevention and cure, insist the prevention and cure of plant pest and protect ecological environment and the guarantee agricultural products quality safety. Province, city and county government should strengthen leading work for local plant pest prevention and cure, strengthen plant protection organization and group construction. Above county level agricultural management departments charge local plant pest prevention and cure work, agricultural management departments plant protection departments undertake crops pest inspection, forecast work and crops pest prevention and cure and pesticide safety use guidance, inspection work etc. Country carries out subsidy policy for the significant agricultural prevention and cure of plant pest.

Chinese government have given maximum solicitude for the food safety. Definite explanation in Pesticide Management Statute of PRC (issued by Chinese Government) and Pesticide Safety Use Standard (issued by Ministry of Agricultlutr).

-Which pesticide apply to plant pest prevention and cure
- Which utility and low poison and low remain pesticide can recommend to use in prevention and cure

- The agricultural products that pesticide remain pexceed standard must not enter market sales

- Method of safety use pesticide

The regulation encouragement use utility and low poison and low remain pesticide and have stipulated sales standard of pesticide. Pesticide Safety Use Standard and Pesticide Management Statute of PRC have stipulated some chemistry pesticide such as Parathion, monocrotophos, phorate are prohibited.

2.7 Pest and Disease Management and Regulatory Framework

PMP Pest Management Regulatory Agency pesticide regulatory authority, the pest management agencies and pesticide testing organization. Table 9 shows that postpartum assumed tasks and responsibilities of different departments in the pesticide market management and agricultural production and project implementation.

<table>
<thead>
<tr>
<th></th>
<th>The Tasks and Responsibilities of the Different Departments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Government</td>
</tr>
<tr>
<td>1. Supervision of the pesticide market</td>
<td>Various departments of the organization of industry and commerce, agriculture and law enforcement unit, carry out agricultural markets regularly checked to prevent counterfeit drug sales, to prohibit the sale of highly toxic pesticides in vegetable and fruit production areas.</td>
</tr>
<tr>
<td>2. The management of the agricultural production process</td>
<td>Reference to the World Bank, the FAO and the European Union's standards, validation and modification of highly toxic pesticides banning the use and registration lists; develop more stringent pesticide use regulations strictly prohibits the use of highly toxic pesticides on fruit and vegetable crops; reduce the production of highly toxic pesticides the approval of the registration of enterprises and varieties; strengthen the seedlings of trees and crops seeds the interprovincial deployment of supervision and Inspection.</td>
</tr>
<tr>
<td>3. Agricultural products listed after management.</td>
<td>Sustainable agricultural market system, implementation of agricultural product recall system; strengthen market supervision and inspection of Pesticide Residues; encourage farmers to produce green food and pollution-free food and IPM food, and the establishment of good quality and inexpensive price advantage, driving farmers to consciously taken in the field IPM technology; encourage leading enterprises of agricultural products and farmers to establish order system.</td>
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The project area use pesticides must meet national standards, industry standards or enterprise standards, pesticide packaging, transportation and storage is an essential part of the pesticide from production to use. The pesticide packaging should comply with the State Bureau of Technical Supervision issued GB3796-85 "pesticide packaging General Clauses.
GB4838-84 EC pesticide packaging", GB5736-85 "of pesticide use Gaisu corrugated boxes with the relevant provisions of the three national standards. The pesticide transports execute pesticide storage, sale and use of anti-virus procedures "national standard requirements. Storage shall comply with the general requirements of the safe use of pesticides

The laws and regulations of the country in pesticide production, packaging, storage, transportation, sale and use of international laws and regulations, there is a gap. Pesticide management in Gansu Province and other provinces of the country, not enough supervision, farmers use highly toxic pesticides, excessive use of pesticides, can not comply with the National spraying interval provisions.

In order to deal with the risk of pests and diseases may arise in the implementation of the project to help farmers not only effective pest control hazards, and at the same time without increasing the environmental and agricultural pollution caused by pesticides in the project area, needs the common efforts of the aspects of the government, technicians and farmers.

Responsibilities of various departments

Agriculture and Animal Husbandry Department: Responsible for local agricultural development planning, management of agricultural matters.

Industrial and Commercial Bureau: Responsible for the management of the pesticide market segments.

Quality Supervision Bureau: Responsible for the management of pesticide production processes.

Pesticide Inspection Institute: Responsible for pesticide registration application, use, and supervision and management, and to develop or participate in the development of safe
use of pesticides, pesticide product quality and pesticide residues, or industry standards and other related matters.

Agriculture law enforcement unit: Responsible for quality supervision and management of agricultural chemicals market.

Rural agricultural technology service center: Assist in coordinating to carry pesticide management and integrated pest management techniques publicity about law enforcement and technology departments in local training, guidance.

**Pest management institutions.**

**Responsibilities of various departments**

Provincial Agriculture and Animal Husbandry Department: In charge of the province's agriculture and animal husbandry work. Responsible for the province's agricultural departments at all levels, the organization of the prevention and control of crop pests and diseases. Provincial Plant Protection and Quarantine Station: to carry out phytosanitary regularly published long-term, medium-term and short-term crop pests forecasting, emergency prevention and control of major pests and diseases of crops and lasting control, new pesticides instruments to promote the safe use of pesticides. Propaganda, training pest management techniques to farmers

Provincial Agricultural Technology Extension Station: Assist Agriculture and Animal Husbandry Department to develop relevant management work, responsible for technology promotion.
Provincial Economic crop work station: Responsible for planting plan of the province's vegetables, fruit trees, herbs, and other economic crops technology promotion and pest management.

Counties Agricultural Technology Promotion Center: Responsible for the promotion of agricultural technology in the area; responsible for crop pest control work in the organization, planning, coordination, supervision, decision-making and the development of work management.

Counties and District Plant Protection and Quarantine Station: Responsible for pest control organization and management within their jurisdictions, guidance and supervision. Assist in coordinating to carry pesticide management and integrated pest management techniques publicity about law enforcement and technology departments in local training, guidance.

Township Rural agricultural technology station: Responsible for the monitoring and forecasting of the major pests and diseases in the area, to guide prevention and control in a timely manner.

Agricultural cooperatives and Farmers' associations: Organize local prevention and control of crop pests and diseases

**Pesticide analysis organization:**

![Diagram of Pesticide Analysis Organization]

**Responsibilities of various departments**

Provincial agricultural products quality and safety testing center: Responsible for the supervision and management of the quality and safety of agricultural products of the province, and to guide the supervision of the quality and safety of agricultural products of the cities, counties (districts).

County district agricultural products quality and safety testing center (station): Responsible for local agricultural products quality and safety supervision and management.

The quality and safety of agricultural products wholesale markets and supermarkets inspection station: Responsible for market (supermarket) quality inspection of agricultural products access.
Agricultural production bases of agricultural products quality inspection station: Responsible for agricultural production bases of agricultural products to prospective out quality testing.

3. PMP Integrated Management Plans

3.1 Project Target

Pest management plan of the project is only implemented in 21 towns 6 cities (counties) of Dunhuang, Gaotai, Yongdeng, Lintao, Wushan and Lingtai in Gansu Province, involving about 33500 hm² of arable land and 49900 households. The project intends to adopt integrated pest management methods, implementation of crop pest control an area of 11,100 ha, 01,000 ha forest pest and disease control, improve agricultural integrated pest management standardization and standardization in the project area to reduce the amount of high-poisonous pesticide use 20%, after risk assessment and product registration biological pesticide use increased by 15% or more, control pests and diseases loss below 8%.

The plan will focus on the following tasks

(1) Introduce and populariz IMP technology in project area (village and town), establish biological diversity inspection and treatment plan, Protect to use the resource of natural enemy. Reinforced forecast for agricultural harmful biology.

Training and demonstration in a small area, the introduction of microbial pesticides and new varieties of botanical pesticide control methods as an alternative to harmful chemical pesticides, thereby reducing the adverse effects of chemical pesticides on the environment and human health.

(3) Through farmers study type of field and school to raise farmers’ actual operating ability, training farmers grasp the skill of comprehensive treatment plant diseases and insect pests.

Farmers in demonstration sites to provide pesticide storage and use of training to improve the awareness of farmers on pesticide management and use of prescribed.

Pesticide distribution technology for technology promotion stations, county and city projects do provide training, raise awareness of integrated pest management (IPM).

Strengthen ties with the quality supervision departments to strengthen the regulation of the sale and use of pesticides in the demonstration area, in order to ensure compliance with the World Bank about the project the requirements "OP/BP4.09" and other international conventions, guidelines pesticide terms of use.

3.2 Project Active Content

Gansu Province Implement Sustainable Agriculture Projects Using World Bank Loan Pest Management Plan will aim to specific crops of different project villages and towns, as
soon as possible adopt agriculture, physics, biology and chemic prevention and cure etc comprehensive measure to treat plant diseases and insect pests to reduce support of synthetic chemical pesticide.

3.2.1 PMP integrated pest management plan concept

PMP integrated pest management plan is the implementation of integrated pest management to control pests, improve the level of safety of agricultural products, the protection of the ecological environment and improve the quality of farmers aim to reduce reliance on synthetic chemical pesticides to control pest activity at the level of economic harm. Its core the connotation of IPM is (1) prevention and cure insect, not eliminate insect. (2) as soon as possible rely on non-chemical measure to make pests quantity remain in lower level. (3) While having to use insecticide, option of insecticide and use must reduce it for crops, mankind and environmental influence arrive minimum. (4) establish accords with the standardization IPM technical system of regional characteristic. Integration agricultural prevention and cure, biological prevention and cure, ecological control and physics avoided harm and trap kill technology, high limit replace and reduce the use of chemical pesticide, as far as possible to avoid kill and wound natural enemy and pollutive environment, control plant diseases in the level that can be borne.

3.2.2 Main activity

(1) Strengthen plant diseases and insect pests forecast. Every city and county Plant Protection and Pland Inspection Station should offer plant diseases and insect pests information before 7-10 days of plant diseases and insect pests prevention anc cure, include prevention and cure object, use medicine kind for elephant, prevention and cure suitable period, prevention and cure technology of and prevention and cure pesticide. And take plant diseases and insect pests prevention and cure pertinency, this can raise prevention and cure effect and reduce pesticide use quantity.

Agricultural control. According to the specific circumstances of the 6 project counties, according to local conditions, targeted use of the following agricultural preventive measures:
Select fastness variety. Select fine fastness variety is one of important measures of raise crops fastness, Develop biological and genetic resistance potential, establishing biodiversity, reduce chemical pesticide use quantity.

Rotation of crops. Rotation of crops major for avoid farming continuously cause plant diseases and insect pests aggravate.

Reasonable intercropping interplanting and restoration planting. Such as corn and soya intercropping can reduce aphid, potato and horsebean intercropping can reduce soil disease.

Adjust sow period. In advance or postpone crop sow period, Make crop stagger or hide plant diseases occur peak issue to avoid or alleviate plant diseases occur.

Cultivation measure. Deep cultivation, take incomplete stubble and rank grass bury in soil, avoid insect egg breeds; after crop reaped, falls out immediately to plough, extinguish stubble to reduce rice caterpillar occur.

Cultivate no disease strong sprout. Better seed and soil sterilized handling, exclude bad sprout and cultivate strong sprout.

Balance apply fertilizer, save water irrigation. Use basic compost enough, control nitrogenous fertilizer, saving phosphate fertilizer, increase potash fertilizer to strengthen the disease-resistant insect ability of crop. Implement water saving water irrigation technology of drop irrigation under film, alternate irrigation and unsaturate irrigation to reduce forcing house vegetable humidity and plant diseases and insect pests occur.

Graft. Popularize cucumber, aubergine graft technology in sunlight forcing house, general prevention and cure effect of blast, epidemic disease and cyanosis ic over 90%.

Clean field. Clean lamina, stick or disease body that infect catch a diseas to reduce disease pests source.

(3) Physical prevention and cure effect

Span prevent pest net. Apply in vegetable and fruit trees planting to take the roles of prevent pests, prevent disease, prevent rain, prevent wind, cover light and keep wet.

Trap and kill. Use yellow mucilage glue board to trap and kill powdery mildew louse and aphid etc. Use black light and frequency shake light to trap and kill miller, beetle and orthoptera etc, use sugar-vinegar trap and kill miller etc.
Line with the physical control techniques, applications Frequency insect lights 817 sets in six project demonstration counties.

(4) Biology prevention and cure effect

① Use biology preparation, such as Btemulsion, Liuyang mildew element, Nuclear polyhedrosis virus, Beauveria bassiana, kasugamycin, Jinggangmycin

② Use plant diseases and insect pests natural enemy, such as Trichogramma.

③ Use sex attractant trap and kill plant diseases and insect pests, such as Chilo suppressalis, diamondback moth, corn borer.

Application biological control technology 5000 ha. in six project demonstration counties.

(5) Chemical prevention and cure

Chemical prevention and cure applied combine with other prevention and cure measure is the effective measure to raise prevention and cure benefit and guarantee agriculture plenteous harvest. Its require use pesticide of high quality, high effect and no poison or lower poison, safety for crops. Major chemical prevention and cure measure includes:

① Prohibit use drama poisons, high poison, high remain pesticide strictly. With respect to chemical pesticides classification, refer to the latest World Health Organization's Recommended Classification of Pesticides by Hazard and Guidelines to Classification.

② Prevention and cure different plant diseases and insect pests should use different kind pesticide, accomplish to suit the medicine to the illness.

③ According to plant diseases occur period use pesticide at the right moment.

④ Suitable quantity uses pesticide.

⑤ Mix supersede to use pesticide reasonably.

3.3 The expected outputs of PMP project (Major crop and the trees integrated pest management technology)

Major crops implement pest management in project area insist the planting protection policy if “mainly with prevention, synthesize prevention and cure, green defence and control”, Advocate to utilize agriculture, biological, physical measure, reduce frequency and the area of chemical prevention and cure as far as possible. Advocate to choose the
biological prevention and cure pesticide, according to crop kind and different insect, choose low poison and low remain pesticide, stop high poisonous and high remain pesticide firmly.

3.3.1 Wheat

Major plant diseases and insect pests. Stripe rust, powdery mildew, bunt, take-all disease and root rot, pests have wheat aphid underground wireworm, grub

Target of plant diseases and insect pests treatment.

- Carry out and comply with stipulation of using pesticide safety interval period and prohibit to use the high poisonous pesticide strictly.
  - Chemical pesticide dosage reduces 15-20%.
  - Plant diseases and insect pests’ loss rate control below 5%.
  - Prohibit productivity pesticide poisoning accident.
  - Maintain farmland biological multiformity, reduce the quantity of plant diseases.

The index of prevention and cure of major plant diseases

- Stripe rust and powdery mildew. Condition index control within 5
- Foot rot and root rot. Individual plant in field incidence of disease is above 3%
- Underground pests. Control for harming cause the wheat dead sprout rate below 5%
- Aphid. Quantity of Hundred ear aphids control below 800.

Method and strategy of plant diseases and insect pests prevention and cure

- Prevention and cure strategy. Rust basic with forecast, key point with pesticide prevention and cure. Powdery mildew basic with health planting, key point with pesticide control. Foot rot and root rot basic key point with mix the seeds with pesticides.

- Agricultural prevention and cure. Seed cultivation and use anti-disease and disease resistant variety is the most economy and most efficiency way to prevent wheat disease. Now have cultivate many anti-disease variety, can choose according to the actual condition of every place, especially, choose the kind of various anti-disease simultaneously to realize effective control for disease.

- Biology prevention and cure. Select to use mild or low poison chemichal pesticide that execution is small to cornfield natural enemy, avoid Ladybird, Syrphidae, lacewings etc. Develop natural enemy control role to pests of aphid and wheat armyworm etc. Demonstrate application biological pesticide to prevent and cure wheat Take-all disease,
popularize application Ningnanmycin to prevent and cure wheat powdery mildew. Use Avermectin to prevent and cure gree wheat mite and wheat armyworm spider. Use 300 time 0.3% Matrine liquid to prevent and cure wheat aphid and gree wheat mite, use 3% Antitoxin to prevent and cure wheat powdery mildew.

● Chemical control. Pharmacy mixed seeds, seed amount 0.2% triadimefon the seed dressing Prevention rust and powdery mildew; wheat before heading when diseased leaves rate of 10% with 15% triadimefon WP, 25% triadimefon EC, or 20% triadimefonEC foliar spray, occurs in moderate 1 Year spray can the large occurrence Year spray 2-3 times. Dressing treatment, the use of of triadimefon or tebuconazole alcohol fungicides reduce wheat stripe rust and powdery mildew, fishy black Sui, the Gaeumannomyces harm; biological insecticides acetamiprid or imidacloprid low toxicity pesticides insecticides against wheat aphids.

3.3.2 Corn

Major plant diseases and insect pests. Corn smut, head smut, root rot, stalk rot, top rot, size, spot, two urticae, underground pest, corn borer etc.

Target and index of plant diseases and insect pests treatment.

● Carry out and comply with stipulation of using pesticide safety interval period and prohibit to use the high poisonous pesticide strictly.

● Chemical pesticide dosage reduces 10%.

● Plant diseases and insect pests’ loss rate control below 5%.

● Smut, head smut disease individual plant rate control below 5%.

● Prohibit productivity pesticide poisoning accident.

● Maintain farmland biological multiformity, reduce the quantity of plant diseases.

Method of plant diseases and insect pests prevention and cure

● Agricultural prevention and cure. Select anti-disease and disease resistant variety, rotation of crops reasonably, adopt file cover and ridge culture furrow irrigation technology, strengthen field water fertilizer management, control nitrogenous fertilizer and increase kainite, prevent plant growth exuberant. Extirpate corn smut tumor in time, extripate underpart disease leaves during large (small) spot disease occur period. Two urticae can prevent live through the winter pests source and reduce harm.
● Biology prevention and cure. Protect to use natural natural enemy. Develop the role of Chrysopa Sinica, Trichogramma ostriniae, ladybug to control Corn borer, aphid. popularize application Bt emulsion and Matrine to prevent corn borer. Adopt wweet and sour liquid to trap and kill corn borer, armyworm, tiger and other pests, also can set sex attractant for male adults to damage corn borer mating.

● Chemical pesticide prevention and cure. Corn smut can mix the seeds with pesticides of 50% Thiram WP or 50% Carbendazim WP to prevent and cure. Root rot can mix the seeds of pesticides with 75% Chlorothalonil WP and 80% Mancozeb WP to prevent and cure. Use 25% Kuaishaling, 75% Mancozeb and 150g water spry to prevent and cure the three generation of corn borer, aphids, size of leaf spot disease.

3.3.3 Potato

Major plant diseases and insect pests. Potato late blight, early blight, virus disease, Rhizoctonia disease, bacterial ring rot, aphids and underground pests etc.

Target and index of plant diseases and insect pests treatment.

● Carry out and comply with stipulation of using pesticide safety interval period and prohibit to use the high poisonous pesticide strictly.

● Chemical pesticide dosage reduces 10%.

● Plant diseases and insect pests’ loss rate control below 10%.

● Potato late blight harm loss rate control below 5%.

● Prohibit productivity pesticide poisoning accident.

● Maintain farmland biological multiformity, reduce the quantity of plant diseases.

Method and strategy of plant diseases and insect pests prevention and cure

● Prevention and cure strategy. Based with disease-resistant kind and ecological adjusting control, grab medicament precautionary measures ruthlessly, Early prevention and emergency prevention and cure combination.

● Agricultural prevention and cure. Select anti-disease and disease resistant variety, choose excellent quality to take off poisonous kind potato. Monitor in time, discover central disease individual plant pull out in time and take field outside bury deeply (depth 1 metre above). Adopt ridge culture, interplanting and prescription apply fertilizer measures. Rotation of crops avoid with eggplant department kind, cross coloured department kind
crop interplanting as far as possible. Carry out cutting tool disinfect, to reduce potato bacterium, prevent disease to occur.

- Biology and physical prevention and cure. Popularize application frequency shake type kill insect lamp, yellow board and sex attractant etc. physics and the biology prevention and cure measure to trap and kill potato insect to ensure ecology safety. Popularize potato microorganism bacterium fertilizer.

- Chemical pesticide prevention and cure. Using metalaxyl or gel for seed treatment. Potato growth early stage choose 64% Antivirus alum WP, or 72% Curzate WP etc. mix water even spraying. Use low poison antiseptic control sooner or later epidemic disease, use medicine frequency and reasonable medicine strictly, reduce the risk of germs resistance to the action of a drug. For burying disease individual plant place scatter lime to disinfect, as around disease individual plant 50 metres spray Mancozeb, metalaxyl, metalaxyl mancozeb to take prevention treatment.

3.3.4 Cotton

Major plant diseases and insect pests. Fusarium Wilt of cotton, yellow dwarf disease, seedling root disease (Rhizoctonia disease, anthrax disease, damping-off), aphid, to cotton bollworm

Target and index of plant diseases and insect pests treatment.

- Carry out and comply with stipulation of using pesticide safety interval period and prohibit to use the high poisonous pesticide strictly.
  - Chemical pesticide dosage reduces 10%-15%.
  - Plant diseases and insect pests’ loss rate control below 8%.
  - Cumulative damage rate of buds and bolls of cotton bollworm control below 5%.
  - Prohibit productivity pesticide poisoning accident.
  - Maintain farmland biological multiformity, reduce the quantity of plant diseases.

Method and strategy of plant diseases and insect pests prevention and cure

- Prevention and cure strategy. With the foundation of popularizing application disease-resistant insect kind and gymnastical culture, protect and use natural enemy, coordinative application agriculture and biological, chemical etc. prevention and cure measure.
Agricultural Prevention and cure. Plant resist disease fertility products, increase purify and spread of high quality cotton variety. Carry out width and narrow standardization plant, measure soil prescription to apply fertilizer, drop irrigation under film, sheepshank amine whole course chemical pesticide control, cotton, corn or bean interplanting. Reasonable crop rotation, reduces the Pathogenic bacteria accumulation in soil, reduces incidence of disease. Turn deeply irrigation in winter, shovel ridge to extinguish pupa, put in order field straw, incomplete branch and withered boll, depress radices of disease insect living through the winter.

Biology and physical prevention and cure. Protect to use natural natural enemy. Develop the role of Ladybirds, spiders to control Cotton aphid and cotton bollworm. Popularize application Bt emulsion and Matrine to prevent Cotton aphid and cotton bollworm. The planting corn of cotton field trap and kill insect egg, lamplight and willow branch trap and kill insect. Use cotton bollworm phototaxis, cotton field set up frequency shake type moth-killing lamp trap and kill insect. Use cotton aphid tend to yellowness, cotton field establish yellow board of butter, trap and kill the long wing he long wing type adult aphid. Use cotton bollworm tend to sexual, use cotton bollworm trap sex to kill insect, reduce field insect and egg quantity.

Chemical pesticide prevention and cure. Mix the seeds with pesticides, use 36% Trichloroisocyanuric acid 60g add 10% Imidacloprid 20g add water spray to prevention and cure wilt and cotton aphid during seeding stage. Use Bt emulsion 75 ml or 25% Kuaishaling 75 ml add water spray to prevent and cure second generation cotton boll worm and first generation of corn borer during bud stage.

3.3.5 Grape

Major plant diseases and insect pests. Grape powdery mildew, downy mildew, Rhizopus ear rot and gray mold, as well as the whitefly, red spiders and phylloxera.

Target and index of plant diseases and insect pests treatment.

- Carry out and comply with stipulation of using pesticide safety interval period and prohibit to use the high poisonous pesticide strictly.
- Chemical pesticide dosage reduces 10%-15%.
- Plant diseases and insect pests’ loss rate control below 8%.
• Prohibit productivity pesticide poisoning accident.

**Method and strategy of plant diseases and insect pests prevention and cure**

• Prevention and cure strategy. Insist principle of "Mainly with prevention, comprehensive prevention and cure", in line with mainly train of thought of safety, efficiency, economy, simple and convenient and give priority to avoid, utilize the prevention and cure measure of agriculture, biology, physics and chemistry correctly, according to local conditions to control occur plant diseases quantity under economic promise level to get economy, ecology and social benifit best.

• Agricultural Prevention and cure. Select anti-disease variety and asexual graft to cultivate grape sprout. Strict plant quarantine and sprout wooden sterilized handling. Popularize new tree shape, settle garden in winter, drive down the base of orchard disease insect to live through the winter. Prune reasonably, control result quantity, pick heart to wipe bud in time, strengthen management, improve ventilation, and light conditions, increas organic fertilizer and Phosphorus and potassium fertilizer, control nitrogenous fertilizer to avoid pupil length and saving water irrigation, reduce greenhouse humidity, clear away disease fruit in time after attack.

• Biology and physical prevention and cure. Core is treat insect with insect and treat bacterium with bacterium. Apply agricultural 404 biological pesticide daub the place of cancer disease cutted. Use 120A and 120BF antibiotic prevent and cure powdery mildew. Install black light trapping pests; microbial pesticides and inorganic insecticide, protection and utilization of natural enemies.

• Chemical pesticide prevention and cure. Before dormancy inn winter, spray green lime sulfur mixture one time to eradicate disease pests , before burgeon next year, spray once again. Start from July, spray 200 times Bordeaux mixture or sulfur suspension emulsion 3 times per 15 days to prevent and cure powdery mildew and downy mildew etc. Downy mildew prevention with Ke Shuangling, whitefly with imidacloprid controlling, red spider mites die with pyridaben, net control. Powdery mildew incidence of early available LSSS, Triadimefon, diniconazole for controlling. In facility grape culture course, annual grape individual plant spray lime sulfur mixture 2 times and bordeaux mixture 4 times.

**3.3.6 Vegetable**
**Major plant diseases and insect pests.** Major have Soft rot, downy mildew and virus disease, diamondback moth, cabbage aphid etc.

**Target and index of plant diseases and insect pests treatment.**

- Carry out and comply with stipulation of using pesticide safety interval period and prohibit to use the high poisonous pesticide strictly.
- Chemical pesticide dosage reduces 30%.
- Pesticide remain quantity in vegetable mustn’t exceed the standard of state regulated.
- Prohibit productivity pesticide poisoning accident.
- Cumulative damage rate of plant diseases and insect pests control below 8%.

**Method of plant diseases and insect pests prevention and cure**

- **Agricultural Prevention and cure.** Select anti-disease variety, Suitable stage sow seeds, cultivate sprout of strong without plant diseases, deploy individual plant row spacing and optimization vegetable group structure reasonably. Carry out field crop and vegetable rotate crops, reduce pathogeny and pests source accumulation in soil. In vegetable growth season, pull out central disease individual plant in time, pick diseas leaf and disease fruit. Remove egg masses of Spodoptera litura as well as Diamondback moth harmed "Screen window leaf", and centralize to burn out.

- **Physical prevention and cure.** Yellow sticky board used to control aphids, leafminers, Bemisia tabaci, aphids, thrips and whitefly. Light trapping capable of trapping and killing Noctuidae pests, diamondback moth, pod borer manifold pest imago to reduce phototaxis pests kind crowd quantity.

- **Biology prevention and cure.** Apply biology sterilization as well as Virucidal agents and insecticides mainly. Use streptomycin, prevention and treatment of a variety of bacterial diseases. Use agricultural antibiotic 120 to prevent and cure melon powdery mildew, anthracnose and Fusarium Wilt of melon and vegetable root rot. Use Polyoxyinto prevent gray mould, cucumber downy mildew, Melon Fusarium Wilt of vegetables. Use plant disease virus spirit, spirit, Junduqing on tomato, peppers, melons and virus disease of crucifers. Use Bt, Botanical insecticide, toosendanin, Osthol and Avermectin to prevent and cure diamondback moth, cabbage, cabbage webworm and other Lepidoptera pests.
• Chemical pesticide prevention and cure. According to vegetable kind and culture way, focal point will grasp each bearing stage prevention and cure. Use crown of Chlorothalonil add 2.5% decamethrin 1500 times liquid spray during seedbed period, major cure blight, anthrax disease, damping-off, cutworm. Use 5% Metalaxyl mancozeb 1500 times liquid during seeding stage to cure gray mold, mildew, early, late blight disease. Use Trichloroisocyanuric acid add 5% Fipronil 50 ml spray, major cure plant diseases and insect pests of Viral diseases, bacterial soft rot, anthracnose, Bemisia tabaci. Vegetable bearing stage is short, plant diseases are harmful and serious, the frequency of prevention and cure is more, must carry out pick within pesticide safety distance stage.

3.3.7 Facilities Vegetable

Major plant diseases and insect pests. Major have grey mildew, blight and downy mildew of Cucumber as well as Whitefly (Bemisia tabaci and Tabaci lice), Liriomyza sativae, aphid, red spider etc.

Target and index of plant diseases and insect pests treatment.
• Carry out and comply with stipulation of using pesticide safety interval period and prohibit to use the high poisonous pesticide strictly.
• Chemical pesticide dosage reduces 30%.
• Pesticide remain quantity in vegetable mustn’t exceed the standard of state regulated.
• Prohibit productivity pesticide poisoning accident.
• Control temperature and humidity of forcing house to reduce the quantity of plant diseases
• Cumulative damage rate of plant diseases and insect pests control below 8%

Method and strategy of plant diseases and insect pests prevention and cure
• Prevention and cure strategy. Prevention and cure strategy is “Basic with disease insect forecast, optimize agricultural ecological environment as center, endanger and reduce farm chemical for central, effective control disease insect and reduce pesticide remain for goal. Synthesize to utilize agriculture, biology, physical prevention and cure and scientific application chemical prevention and cure”. Raise pesticide application technology, reduce vegetable pesticide remain and plant protection precaution against natural calamities risk,
ensure that the quality of agricultural products is safety and ecological environmental protection.

- **Agricultural Prevention and cure.** Plant disease-resistant kind; Soil disinfected; Adopt nutrition earth and nutrition bowl, grow seedlings matrix and the line of terrestrial heat to grow seedlings new method, cultivate "no-disease insect" strong sprout; Adopt graft change root prevention and cure wilt Verticillium wilt,, and nematode and soil borne disease; Apply reasonable crop rotation, the bored shed of high temperature and other technology, prevention and cure downy mildew, powdery mildew, bacterial angular leaf spot disease, tomato early blight, late blight and leaf mold occur. adopt planting mode of double ridge cover film and drop irrigation under film, reduce the air relative humidity in shed, alleviate high wet disease such as gray mold and mildew propagation.

- **Biology prevention and cure.** Insect natural enemy. Use Trichogramma on controlling Pieris, diamondback moth and other Lepidoptera pests, Aphids, whitefly lacewings may prey on a variety of lepidoptera pest egg. Encarsia formosa control whitefly. Microorganism prevention and cure. Bacillus thuringiensis, Beauveria bassiana, such as pesticide Avermectin can kill insects. Biological medicament. Agricultural antibiotic 120 and Polyoxin can prevent damping-off disease, downy mildew, powdery mildew, leaf spot and blight, Fusarium Wilt. Validamycin can prevent and cure Blight, Southern Blight, sheath blight. Plant source pesticide such as Azadirachtin, hellebore alkaline alcohol solution can reduce the diamondback moth, Spodoptera exigua, Bemisia tabaci. Matrine, Melia azedarach, nicotine on various pests have certain prevention and cure role.

- **Physical prevention and cure.** Hang yellow sticky insect board or the yellow board of machine oil to trap and kill aphids, whitefly and leafminer. Sweet and sour liquid killing Noctuidae pests, black light lamp trapping many moths, beetles, leafhoppers etc.

- **Chemical pesticide prevention and cure.** Majoe is grasp greenhouse vegetable disease insect occur regular pattern, suit the remedy to the case. According to the characteristic of shed room closeness, choose smoke and dust method as far as possible. Notice to use reasonably alternately with some kinds of pesticide, prevent that disease insect produces resistance action of pesticide. Apply different method and skilful use pesticide, such as pumpkin and cucumber gray mold, do not spray pesticide and key spray
fruit top all-sidedly, prevention and cure of hot pepper Phytophthora Blight focal point spray stem base department. Prevention and cure aphid can apply the method of stem with Dimethoate; notice safety interval stage of pesticide.

Such as use 5% Chlorothalonil dust prevention and control of gray mold; use 5% Chlorothalonil powder, 5% Chlorothalonil smoke prevention and cure epidemic disease. also can use 10% Imidacloprid WP or 3% acetamiprid EC solution spray.

3.3.8 Apple

**Major plant diseases and insect pests.** Major have rot, powdery mildew, mosaic and so on, pests have moth, leaves a shadowed, mosaic and codling moth etc.

**Target and index of plant diseases and insect pests treatment.**

- Popularize biology pesticide, make chemical pesticide dosage reduce over 30%.
- Annual chemical pesticide preventure and cure times reduce 3-5 times, nonuse inhibit pesticide kinds.
- Cumulative damage rate of plant diseases and insect pests control below 10%
- Pesticide remain quantity in fruit mustn’t exceed the standard of state regulated

**Method and strategy of plant diseases and insect pests prevention and cure**

- Prevention and cure strategy. Insist plant protect principle of "Mainly with prevention, comprehensive prevention and cure”. Take agricultural prevention and cure and physical prevention and cure as foundation, biological prevention and cure as core, according to apple plant diseases occur regular pattern and economic threshold value, Use the chemical means of prevention and cure scientifically reasonably, and option safety, high effective, low poison and no pollution pesticide and control the harm of disease insect under economic victimized level all along.

- Plant quarantine and forecast. Carry out quarantine strictly for apple aphid, small Flathead borer, fruit rust and codling moth. According to insect growth progress, apple growth phenological period and use insect tropism (such as black light, sweet and sour liquid trap) forecast to measure occur stage, according to field insect base data investigation, meteorology factor analysis, can carry out insect occur quantity forecast.

- Agricultural Prevention and cure. Strengthen water fertilizer management, more use organic fertilizer and compound fertilizer. Popularize fruit to cover bag and land membrane,
crop straw stalk cover technology, especially dry land ridge film gather rain protect moisture technology. Popularize high light effect tree shape construction technology, clear away the incomplete branch fallen leaves of disease insect harm in garden. In winter, after leaves fallen, clear away the incomplete branch fallen leaves of disease insect harm in garden, take out and centralized besides garden burnt out or bury deeply.

- Biology prevention and cure. ① Treat insect with insect. Major have Ladybirds, lacewings, Orius, robber flies and insectivorous bug etc. have the best extinguish effec for aphids, mites, and the moth tortrix. As well as measures of using the insect hormone prevention and cure insect and using beneficial birdtreat insect etc. ② Treat insect with bacterium. Major have Fenitrothion bacillus, Bacillus thuringiensis, Beauveria bassiana, budworm bacterial Bt emulsion. They have the good effect of prevention and cure for variety of larval Lepidoptera. ③ Treat bacterium with bacterium. Use Kasugamycin control rot, and penicillin Jinggangmycin to prevention and cure early Defoliation Disease Prevention, grisein flower rot have good effect.

- Physical prevention and cure. Around trunk cover film to separate live through the winter insect come out, using lamplight, poison bait and grass etc. trap and kill insect. Again as using scrape bark and fruit cover bag etc. measure is the effective method of physical prevention and cure plant diseases.

- Chemical pesticide prevention and cure. First is use Choose biological pesticide and high effective low poison and low remain kind of pesticide first, such as the source of biological pesticides of pyrethrum, vegetable oil emulsions etc.; mineral source pesticide of mineral oil emulsion, low acid value oil emulsions; organic synthesis and low toxicity pesticides Moth mites Ling, phoxim, thiophanate methyl, carbendazim, Bordeaux mixture. Carry out the pesticide safety use interval stage strictly, allows used kind of pesticide 2 times in one year at most. Final once use pesticide distance apple pick time interval should more than 20 days. According to minimum effective dosage and density scientific use, prevent spray again and leak to spray. The different role mechanism pesticide is used alternately and mixed reasonably can delay germs and insect produce fastness.

- PMP measure. According to plant diseases and insect pests occur condition of apple each bearing stage, aim to main harmful object adopt to synthesize treatment measure,
divides into five stages of spring shoots sprouting to blossom period, blossom to fruit, fruit swelling period to fruit ripening period, winter dormancy to flower bud differentiation period, adopt corresponding measure.

Spring shoots sprout to flower early. Attending scab and scarabs etc.

Comprehensive measures. Cut off a serious pest of foliage, with the Park burned to reduce overwintering pests’ quota. To improve the environment for the survival of predatory mites and other pests and natural enemies.

Spraying once mancozeb before bud.

Attending scarab. The choice of beta-cypermethrin the pyrethroid insecticides prevention.

Flowering to young fruit. Focus on the control of scab, pear psylla, black spot, aphids, chafer, such as spider mite

The saplings park planting peanuts, soybeans and other crops, and create a good ecological environment. Into the dry season, Orchard shallow plowing turf can be drought and soil moisture.

Spider mite control: in the spider mite infestation peak, generally gondii strains take pick Governance Center, and generally harm the whole park, take a comprehensive pesticide prevention. Choice of Bt amitraz, Tuo Erke, Liuyangmycin other agents.

Control aphids. Choice of imidacloprid prevention.

Fruit enlargement to the fruit turn ripe stage. Focus Combat Carposina and other.

The implementation of Fruit Bagging: when the the fruit entering enlargement growing season, bagging timely.

Spider mite control. Can use pyridaben Tuo Erke, amitraz.

Winter dormancy to flower bud differentiation stage.Cleaning up the orchard, closed orchard.

Combat wintering mites, scales: fruit picking, spray 80 times the oil emulsion, or 12 times the pine alkali mixture.

Tree trunk painted white, the tree stump obstruct soil (after spring clawed), anti-pest to cold anti-sunburn.

Cleaning up the orchard and closed orchard in winter. Cut off the worm sticks, scrape on the trunk and main branch warping, eggs, and sweep the ground litter and weeds, concentrated fire. The Qing Yuan optional 0.5 to 1 degrees Baume lime sulfur.

3.3.9 Farmland and road shelterbelts

Suitable species and pest species. Farmland shelterbelts resistance, barren antifreeze species of poplar, elm, weeping willow, Sophora japonica, tetraploid black locust, Scotch Pine, spruce, oriental arborvitae conifers, forest jujube, pepper, fruit trees, sea buckthorn
and other. Major pest of farmland shelterbelts fall webworm, Anoplophora nobilis, Anoplophora glabripennis Ching Yeung germari, cinerarius, poplar rot; economic forest for apple insects Little Gidding, codling moth, oriental fruit moth, spider mites, fruit rot, pepper rust and root rot; coniferous forests of pine wood nematode, valens, larch dieback disease pine blister rust, slash pine mealybug.

Method and strategy of plant diseases and insect pests prevention and cure

- Prevention and cure strategy. Insist plant protect principle of "Mainly with prevention, comprehensive prevention and cure". Take agricultural prevention and cure and physical prevention and cure as foundation, biological prevention and cure as core, Use the chemical means of prevention and cure scientifically reasonably, and option safety, high effective, low poison and control the harm of disease insect under economic victimized level all along.

Control methods. Great importance to the seedling sources strict quarantine, clear the disease stems. Autumn anti-based selection of fine species, and actively cultivate, planting superior varieties of pest-resistant; adapted to local conditions, and to take forest grain, fruit trees and vegetables, grass intercropping and other agroforestry way to reduce the degree of pests and diseases; Drug Prevention , spring and fall prevention combined with the 40% asomate 50 times, the 50% tuzet 100 times, 70% thiophanate 100 of times, 50% carbendazim 200 times and 190 times the lye Bordeaux or lime sulfur can prevent pepper rust of poplar pests and diseases have a good effect;

3.4 The Principle of Bio-pesticide Use

Gansu Province Implement Sustainable Agriculture Projects Using World Bank Loan select and use pesticide according to following standards.

(1) Harmless for the health of human body; (2) Effect obviously for goal species; (3) Influence less for non-goal species and environment; (4) Must not repeat use same kind pesticide; (5) Must be efficient, low poison, low remain or no remain biological pesticide. Table 10 lists the items (classified according to the WHO recommended pesticide hazards and Classification Guide) and the risk of the use of bio-pesticide toxicity.

<table>
<thead>
<tr>
<th>The name of the</th>
<th>Toxicity classification</th>
<th>Target species</th>
<th>Risk</th>
</tr>
</thead>
</table>

Table 10 The project intends to use biological pesticides
<table>
<thead>
<tr>
<th>pesticide</th>
<th>*(WHO)</th>
<th>assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kasugamycin, penicillin</td>
<td>Low toxicity, III</td>
<td>Tomato leaf mold, cucumber angular leaf spot, and pepper scab</td>
</tr>
<tr>
<td>Bacillus (Bt)</td>
<td>Low toxicity, III</td>
<td>Diamondback moth, tobacco budworm and corn borer</td>
</tr>
<tr>
<td>Bassiana</td>
<td>Low toxicity, III</td>
<td>Corn borer</td>
</tr>
<tr>
<td>Trichogramma</td>
<td>Slightly toxicity, III</td>
<td>Corn borer</td>
</tr>
<tr>
<td>Liuyangmycin</td>
<td>Low toxicity, III</td>
<td>Aphids and spider mites</td>
</tr>
<tr>
<td>Pyrimidine nucleoside antibiotics</td>
<td>Low toxicity, III</td>
<td>Cabbage black spot, vegetables, powdery mildew, anthracnose, downy mildew, tomato early blight</td>
</tr>
<tr>
<td>Diamondback moth granulosis virus</td>
<td>Low toxicity, III</td>
<td>Diamondback moth</td>
</tr>
<tr>
<td>Polyoxin</td>
<td>Low toxicity, III</td>
<td>Cucumber downy mildew, cucumber powdery mildew</td>
</tr>
<tr>
<td>Predatory mites</td>
<td>Low toxicity, III</td>
<td>Mites</td>
</tr>
<tr>
<td>Ningnanmycin</td>
<td>Low toxicity, III</td>
<td>Wheat powdery mildew</td>
</tr>
<tr>
<td>Matrine Polyoxin</td>
<td>Low toxicity, III</td>
<td>Wheat aphids, powdery mildew</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>Low toxicity, III</td>
<td>Grape powdery mildew</td>
</tr>
<tr>
<td>Agricultural antibiotics</td>
<td>Low toxicity, III</td>
<td>Vegetable damping-off disease, downy mildew, powdery mildew, blight</td>
</tr>
<tr>
<td>Chinaberry the hormone, osthole</td>
<td>Low toxicity, III</td>
<td>Diamondback moth, cabbage worm, cabbage webworm Lepidoptera pests</td>
</tr>
<tr>
<td>Veratryl alkali alcohol, nicotine</td>
<td>Low toxicity, III</td>
<td>Diamondback moth, beet armyworm, whiteflies</td>
</tr>
<tr>
<td>Acetamiprid, imidacloprid class</td>
<td>Low toxicity, III</td>
<td>Wheat aphid</td>
</tr>
<tr>
<td>The fenitrothion bacilli</td>
<td>Low toxicity, III</td>
<td>The variety of fruit trees Lepidoptera larvae</td>
</tr>
<tr>
<td>Streptomycin</td>
<td>Low toxicity, III</td>
<td>Cabbage soft rot</td>
</tr>
<tr>
<td>New plant neomycin</td>
<td>Low toxicity, III</td>
<td>Cabbage soft rot, bacterial wilt of tomato, cabbage leaf spot</td>
</tr>
<tr>
<td>Lime sulfur</td>
<td>Low toxicity, III</td>
<td>Wheat rust, wheat powdery mildew, wheat scab</td>
</tr>
<tr>
<td>Jinggangmycin</td>
<td>Low toxicity, III</td>
<td>Size blotch of corn, melons blight</td>
</tr>
</tbody>
</table>

The drugs used in this project are of human low toxicity or slightly toxic. There is an obvious role of target objects.
Nuclear polyhedrosis virus | Low toxicity, III | Bollworm
Avermectin | Low toxicity, III | Diamondback moth, spider mites, root knot nematode
Bacillus thuringiensis (Bt) | Low toxicity, III | Orthoptera, Coleoptera, Diptera pests

* Toxicity classification according to the WHO Recommended Pesticide Hazards Classification and Classification Guide.

The pesticide that this project plan to use should accord with the standard of World Bank refer to World Health Organization According to the latest *Harmfulness and the Classification Guide and Make Insecticides Recommended Classification* (Geneveses, World Health Organization).

The project is not purchasing the Prohibition of the Use, not registered, or the World Health Organization I pesticides

### 3.5 Variety and Dosage of Pesticide that Suggest to Use

Project will select agricultural, physical (as if entrap), biological prevention and cure measure of biology pesticide (as if Bt) which equivalent with compound pesticide prevention and cure effect first. Project major support pernicious biology biological prevent and cure measure and seed coating agent. These measures are minimum for influence of environmental and person domestic animal. Besides, for similar crop will be not continuous and repeat use a kind of same pesticide, in order to avoid produce drug resistance. The pesticides should be all state registered products, use correctly accord with *Norm of Pesticide Reasonable Use* (State standard), mark safety for person and target crop. Correct use according to the product label and manual of pesticide (based on *Management Method of Pesticide Manual and Label*). *Pesticide Management Statute of PRC* regulate: Produce, manage and use pesticide in the People's Republic of China should comply with the regulation. *Pesticide Management Statute of PRC* has made detailed stipulation for pesticide registration, produce, management and use.

### 3.6 The Problems of Pesticides in the Distribution Use

The survey showed that farmers, pesticide sales staff the ability to handle pesticides within the range of acceptable risk (ie, the safe storage and use of safety equipment, the pesticide packaging materials and waste safety treatment) there are differences. Training the proposed training program will address these issues.

### 4. PMP Implementation Arrangement

#### 4.1 Project Implementing Agencies Set Up and Responsibilities

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4.1.1 Agencies Set Up
Gansu Province will set up a PMP integrated pest management program supervision and guidance of the Expert Group and the Expert Advisory Group. Supervision and guidance of group of provincial PMO and relevant departments; expert advisory group composed by experts of research and teaching (Gansu Academy of Agricultural Sciences, Gansu Agricultural University) and promotion unit (Plant Protection Station, Agricultural Technology Promotion Station)

4.1.2 Responsibilities of the various stakeholders

Supervision and guidance of the Expert Group

- Project area planting industry demonstration base review
- Supervision of the implementation of the pest control projects
- Coordination of city and county PMO project construction unit activities

Expert advisory group

- Pest management plan for the project area
- Pest and disease management of technical guidance
  - Assist the provincial PMO project implementation, monitoring and evaluation
  - To assist cities and counties in the Plant Protection Station conducted a technical review of the project, in order to decide whether or not to provide financial support
  - Provide technical assistance for PMP technical problems
  - Training of personnel involved in the project
- Help the organization to visit and study activities, to establish contact with the international PMP project
  - Write a guidebook of field operations and other work related to the PMP

City, county plant protection stations

- Primarily responsible for the project area pests monitoring and forecasting
- Responsible for each county project area, PMP planning program development and arrange specific personnel and township (town), farmers' associations organize the implementation of joint research
- Responsible for the technical training of the technical staff of the township (town)
Take effective measures to ensure the implementation of the work of the local PMP

**Grassroots agricultural technology promotion stations**

Responsible for directing the insect pest survey of farmers’ associations, and reported to the county (city) level Plant Protection Station

Under the guidance of Plant Protection Station of county (city) level, responsible for the organization and implementation of integrated pest management plan

Responsible for technical guidance and training to participating farmers

**Provincial agricultural research and teaching institutions**

Involved in project the PMP planning and improvement

Choose to create a technology test area in the project area, showing the effect of new prevention technologies and products

Strengthen the application of the effect of monitoring and evaluation

Involved in the project-related technical training and preparation of training materials

4.2 Capacity Construction

4.2.1 Training

The training content should contain the following aspects

- Related state and local laws and regulations
- Project integrated pest management plan and implementation
- Procurement and safe use of pesticides
- Identification of major pests and diseases, prevention and management of technology
- Safety use pesticide training

- Carry special training to village cadres, farmers and pesticide sales persons for pesticide can cause for environment, use pesticide method recommend use and equipment.

- Carry out training and demonstrate to village cadres, farmers and pesticide sales persons to raise their knowledge for following problems.
  - Profession/health influence that various pesticide may caused
  - Handling and spray method that recommend to use
  - Have approved equipment (as if sprayer and spray nozzle size etc.) and use method
  - Wear safe clothing (length sleeve shirt, mask, hat, gloves, trousers, shoes)
  - Spray pesticide in quiet wind weather
  - Safety storage pesticide, puts pesticide in the cabinet, do not let child contact easily
Safety handle packing and junk pesticide bury deeply or burn out as far as possible.
- Monitor the enforcement of above-mentioned operation. Train again if implement not correct.
- Implement the project management measure that listed.

Purchase plant diseases and insect pests physical and biological utensil, use various plant diseases and insect pests administer technology (agricultural/physics, biological, chemistry), ensure plant diseases and insect pests will not produce drug resistance of pesticide.

4.2.2 Policy implementation (to raise the awareness of the implementation of the policy)

Be strengthened through the implementation of the project, the implementation of integrated pest management awareness, performance is as follows.
- Conduct pesticide management regulation strictly
- Prohibit to use pesticide that no registered in project campaign
- Prohibit to use World Health Organization I kind pesticide in project campaign
- Comply with following regulations strictly:
  - FAO pesticide management, sales and us action statute book (or China relative legal file)
  - FAO pesticide packing and storage guide (or China relative legal file)
  - FAO pesticide correct label method guide (or China relative legal file)
  - FAO discard pesticide and pesticide case disposal guide (or China relative legal file)
- Conducted national environmental protection department related environmental standard of agricultural chemical articles includes pesticide. Ecological demonstration county should still carry out the environmental standard of ecological demonstration county.
- Pass through the successful case and its benifit that discusses and offers PMP plan (especial long-term benefit), Encourage county and town government popularize and support PMP method.
- Require farmers participate in the demonstration base construction, purchase the pesticide by promise and registrated.
- Offer capital support for PMP research and popularization for this project first
4.2.3 Supervision management

Strengthen PMP implementation management through following method.

- Take training for county and town technical and populiza persons and farmers
- Establish a supervision plan to estimate plant diseases and insect pests management and PMP technology application of the project
- Appoint one project management office missionary take charge of inspecting agricultural plant diseases and insect pests management and PMP method organization and implementation, and give proper economic support for PMP management organization
- Take PMP confirm the research and populization plan direction with Gansu Province Agricultural Technology Popularization Station and other scientific research organization (as if Gansu Province Agriculture Academy)
- Establish symbiosis with domestic related organization, strengthen the ability of this project technology
- Strengthen contact between province, city, county, village and village. Solves the arisen problem in time make PMP have implemented smoothly.
- Popularize the measure and method to strengthen reduce high poison pesticide use. Encourage privately owned owner, especially agricultural chemical articles operation owner can adopt PMP method efficiently.

4.2.4 Technical training and human resource development

The training and development of human resources is an important task to strengthen the capacity building of pest management, according to the division of labor and personnel levels of the various departments involved in this work, the training program will provide provincial, city, county, township technician training. The project will be carried out following pest management capacity-building efforts.

- County plant protection experts and technician investigate acceptable organization, such as Gansu Province plant protection plant quarantine station and Gansu Province Agriculture Academy to accept training of plant diseases and insect pests management new method, include specific crops/plant diseases and insect pests PMP method.
- Plant protection experts take training of plant diseases and insect pests management method for populization persons, include specific crop/plant diseases and insect pests PMP method.
• Carry out training for county and village populization persons to ensure pesticide statute get efficiency implementation.

• County technician through farmers field school method to take plant diseases and insect pests management new method and crops/ plant diseases and insect pests PMP method.

• Compile and issue PMP training materials. Material should language concise, and cooperation audiovisual teaching material.

• Encourage woman to participate in PMP campaign.

• According to agricultural production and actual needs of farmers to develop PMP practical technical research.

4.2.5 Farmers Training

Farmers training target is lie in strengthen the safety of farmers and grasp the ability of the common biological prevention and cure of insect pest, ability of administering plant diseases economic efficiently. Includs: How to distinguish plant diseases and insect pests, how carry out the correct decision of prevention and cure and how to adopt the proper measure of prevention and cure.

Farmers accept training 3-4 times during plant diseases and insect pests prevention and cure (1 time per day, training 50 farmers).

Training content including
Morphological characteristics and identification of pests and diseases
Different pest damage characteristics and loss
Major pest natural enemies of insect identification
Occurrence of major pests and diseases
Pests and diseases of field sampling and density estimation method occurs
Pest and disease control threshold
Pest and disease control measures, including: agricultural, physical, biological, and chemical control methods
Technology selection and safe use of pesticides
Safe storage and disposal of agricultural chemicals and their packaging waste
Field survey methods
Control Index
Prevention measures, including comprehensive agricultural, physical, biological, and chemical control of the PMP method safe storage, management and treatment of pesticide waste and packaging containers

Chemical pesticide use and protection requirements

Training may include

- Take the lead of big household and demonstration household
- Province, county and village and town agricultural technology popularization persons that accepted training

- Pesticide salespersons

Gansu Province Plant Protection and Quarantine Station

- Other scientific research organization (as if Gansu Province Agriculture Academy)

4.3 Monitoring and Evaluation

4.3.1 Monitoring Content

Registration and use of pesticides

Implementation of the monitoring plan

4.3.2 Indicators for monitoring and inspection content

(1) Indicators for monitoring (6 items)

- Integrated pest management area (ha)
- The number of farmers to participate in integrated pest management training (persons-month)
- Procurement and use of a number of physical control equipment (Insecticidal lamps number corresponds to the project)
- Procurement and use of the area of biological control measures (ha) (Corresponds to the number of biocontrol project subsidies)
- Changes in pesticide use (The data comes from a typical household survey data)
- Pesticide residues changes (The data comes from the quality of the environment monitoring report)

(2) Inspection content

Pesticide registration. Including the registration of new pesticides and pesticide use in Class I: The quantity of pesticide brand project area retail point of sale, whether the sale or use of Class I pesticides.

Policy issues. Including the extent of the government subsidies for pesticides; implementation of policies and regulations relating to the use of pesticides and to promote integrated pest management.

4.3.3 Monitoring and inspection program

PMO at all levels should be responsible for ensuring the normal conduct of regular monitoring activities. PMO at all levels and Agricultural Technology Promotion Center
should peak period of supervision at any time to check on the implementation of the pest management plan in pests and diseases, and in line with the Bank supervision team project supervision and inspection work. Bank supervision team should be experienced pest control experts monitoring visits 1-2 times a year, generally should be in a year period of high incidence of pests and diseases.

Monitoring of pest management: by all levels of project Office, Plant Protection and Quarantine Station found pest timely reports, timely processing.

Inspection program: Weekdays Office is responsible for inspection by all levels of the project, pests and diseases in the peak of the Plant Protection and Quarantine Station is responsible for the inspection and control.

Responsibility: all levels of Plant Protection and Quarantine Station is responsible PMP guidance, inspection, monitoring and training; staff with the implementation of the project jointly bear the timely detection reports pests and requirements for the implementation of the PMP obligations and responsibilities.

The necessary professional and technical: Plant Protection and Quarantine Station at all levels of plant protection experts and PMP.

Budget: included in the project at all levels to do the day-to-day management, the requirements included in the PMO budget.

4.3.4 The PMP program progress reporting arrangements

Undertake the project per year obligation to timely submission of project progress reports, interim performance report submitted in the project implementation of the medium-term project, submitted by the end of the project, project implementation report.

Project annual and interim reports, including years of project implementation, the use of project funds, the progress of the project, the implementation of the project the effect of the implementation of the project the effect of the expected effect of the differences, the problems in the implementation of the project and the solution.

Submit a report at the end of the project should include the implementation of the project life, the use of project funds, the progress of the project, project implementation effectiveness and evaluation, and implementation of the project the effect of the expected effect of the differences, the problems in the implementation of the project and the solution; project Evaluation of the Implementationis the standardization project to promote technology adoption, increase farmers' income, as well as due to the use of new technologies to the improvement of living standards, the quality and safety of agricultural products reached the level of impact on the ecological environment, the sustainability of the project, project organization and management. The overall effect evaluation of completed projects to analyze the implementation of the project results.

5. Work Plan and Cost Arrangements
In order to complete the goals set by the PMP plan activities and expected outputs, the project plans to carry out the investigation of the underlying data, farmer training, technical assistance, and monitoring and evaluation of four aspects of the work.

5.1 Basic Data Survey

Basic data survey for the preparation of project proposals, design project work plan and select the specific implementation of the location data resources, background information on the impact assessment of pest control projects, understanding and establish before the implementation of the project is very important, as project managers and providers of funds to be used for monitoring the implementation of the project quality, adjust and improve the work plan of the project to provide the basis.

The investigation of the underlying data can be participatory assessment of needs and opportunities, and implementation phases prior to the implementation of the project. Need to build for the sustainability of the project, there are many forces to participate in the network of basic investigation, basic investigation should also be combined with the training of farmers, the cost is included in the training activities. By the project management team to coordinate the management foundation investigation activities.

5.2 Farmer Training

Farmer training is a key component of the PMP integrated pest management plan, target IPM training to help six projects County farmers to establish the principles and methods of the continuous application of IPM technologies and concepts to improve the trained farmers IPM knowledge, plant protection skills, enhance their protection of the environment, a sense of ownership and participation in IPM activities to achieve safe and cost-effective use of pesticides to control pests and diseases, reducing pesticide residues in agricultural products, and to achieve the sustainable development of the production, and the diversity of the ecosystem and the improvement of living standards. Farmer training consists of three areas (Table 12), First counselor training, the counselor training farmers to establish a team, the Farmer Field School training farmers to identify and analyze their own production problems encountered tools, play to their initiative to improve the quality of farmers, farmers mobile training team.

The participatory training: the implementation of the project area farmer field schools, counselors mainly by the township (town) level agricultural extension workers and the specialized training and has extensive experience in the pest management technician composed of farmers, according to local agriculture and forestry crops at different growth stages of the field of pestactual and farmers of the issues raised by the counselors, field targeted guidance and training to farmers on how well the identification and prevention of pests and diseases, to enhance the farmers' technical knowledge of the participants, as well as the organization, communication and management skills training.
The mobile training: The project team should be regularly or irregularly organization composed of experts from the agricultural research institutes, universities and agricultural management and promotion agencies, mobile training teams to the implementation of the project area farmer field schools or township (town) and village training local agricultural extension workers, farmer-technicians, farmers and pesticide dealers, to impart the latest concept of IPM pest latest pollution control technology, the technology of the safe use of pesticides and pesticide management sales related policies and regulations.

Target audience: the county (district), township (town), agricultural extension workers, crop protection designed dry, farmer-technicians, farmers, pesticide dealers.

5.2.1 Counselor training (TOT)
To be offered to qualified farmer field schools, first you must train a strong, able to carry out the training of farmers counselors should organize a pest control, soil nutrients, horticultural crops, cultivation of fruit trees and livestock expert technical support team. Based on the above analysis, the project area to expand the area of crops as vegetables, fruit trees, potatoes, and other crops. According to the characteristics of these crops, the training course of time recommended in the production of a critical period - two months from flowering to fruit harvest. The following aspects should be emphasized that the training courses of the farmer field school counselor

5.2.2 Farmers field school (FFS)
Farmer field schools as an important tool for the understanding and application of IPM principles support to help farmers, farmers' education and technology to promote the new method. According to the project area crop type, typically farmer field schools generally of peasants by 25 trainees concentration of 5-6 hours a week, or month to 5-6 hours. Training for their first season, each team should have the support of counselors, general, counselors should be after IPM training of agricultural extension workers.

Beginning in 2013, each project county annual 5 times (six counties a total of 30 times) field school, and each time the counselor the number 54, the training of farmers per 150 people to 27,000 people during project implementation, training of farmersor so.

5.2.3 Mobile training teams of farmers
With respect to the implementation of the project area, the number of farmer field schools to carry out far less, graduated from TOT farmer field school counselor can only farmer field schools in their work location organization and qualified farmer field school counselor far from being sufficient to carry on training a huge number of farmers' groups, did not participate in the FFS farmers are still facing many urgent problems to be solved. This training mode is taught, not many farmers more flexibility in the selection of training topics, the crop objects and training methods. Constitute a flexible, mobile training team members, including agricultural research and teaching institutions, or agricultural extension agency personnel.
### Table 12 Project Training Plan

<table>
<thead>
<tr>
<th>Type of training</th>
<th>Training content</th>
<th>Training objects</th>
<th>Training form</th>
<th>Number of training</th>
<th>The number of trainees</th>
<th>Total funding</th>
<th>Implementing agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counselor training programs (TOT)</td>
<td>IPM's latest concept</td>
<td>City, county (district), agricultural extension workers of the township (town), plant protection commissioner</td>
<td>Mobile training</td>
<td></td>
<td>480 Person-time</td>
<td>56.0</td>
<td>Project Management Office</td>
</tr>
<tr>
<td></td>
<td>Pest management plan for the project</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Crop pest control technology</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Safe use of pesticides and pesticide management sales related policies and regulations</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Farmers field school (FFS)</td>
<td>Identification of the major pests and diseases</td>
<td>Project area township (town) farmer-technicians, farmers, pesticide dealers, disposal of pesticides and disposal of packaging</td>
<td>Participatory training</td>
<td>Every county of the year focused on training on a regular basis 2 times</td>
<td>27.7 thousand person-time</td>
<td>540.0</td>
<td>Project Management Office</td>
</tr>
<tr>
<td></td>
<td>Prevention and control measures</td>
<td></td>
<td></td>
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<td></td>
<td>Safe use of pesticides and disposal of pesticides and disposal of packaging</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Mobile training teams of farmers</td>
<td>IPM's latest concept</td>
<td>The city and county (district), township (town), agricultural extension workers, plant protection designed dry, agricultural technicians</td>
<td>Taught training</td>
<td>Every county of the year focused on training on a regular basis 2 times</td>
<td>6000 person-time</td>
<td>288.0</td>
<td>Project Management Office</td>
</tr>
<tr>
<td></td>
<td>Project pest management plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crop pest control technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pesticide safe use of technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pests and diseases regular pattern</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 5.3 Monitoring and Evaluation

PMP plan quality monitoring and evaluation should be consistent with the whole project evaluation; the budget should also be consideration together. But plant diseases and
insect pests comprehensive treatment has its professional particularity. So the insect and comprehensive treatment of the monitoring and assessment requirements, this paper puts forward some suggestion evaluation index (Table 13) and budgets, easy to make the overall scheme of total project quality monitoring, evaluation considering.

<table>
<thead>
<tr>
<th>Index</th>
<th>Content</th>
<th>Implementing agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Integrated pest control area ( ha )</td>
<td>Investigation of using PMP program amount of farmer and application area</td>
<td>Project County Plant Protection Station (FFS counselor)</td>
</tr>
<tr>
<td>2. The number of farmers to participate in integrated pest management training (person-times)</td>
<td>Statistics in the field school and unified technical training times and number (by signing and stamping roster training village)</td>
<td>Project Office, County Plant Protection Station, and agricultural technology promotion stations and related associations (farmer field school counselor)</td>
</tr>
<tr>
<td>3. Procurement and use of a number of physical control equipment</td>
<td>Key statistics project village issuing insecticidal lamp, luring version number</td>
<td>Project County Plant Protection Station (FFS counselor)</td>
</tr>
<tr>
<td>4. The area of biological control measures (ha)</td>
<td>The main monitoring release the amount of subsidy for project county biological bactericidal and virucidal agents and insecticides</td>
<td>Project County Plant Protection Station (FFS counselor)</td>
</tr>
<tr>
<td>5. Changes in pesticide use</td>
<td>Project village typical household pesticide use types and quantity survey</td>
<td>Plant Protection Station of project counties</td>
</tr>
<tr>
<td>6. Pesticide residues changes</td>
<td>Project village typical main crops and vegetables, fruit and other products pesticide residue monitoring</td>
<td>Provincial agricultural product quality testing organizations</td>
</tr>
</tbody>
</table>

5.4 Funding Arrangements

The PMP program objectives and tasks, activities, expected outputs and their technology roadmap has its particularity, the total project should be considered separately and charged to the budget. Budgetary provisions should be included in the overall cost of management of the PMO and the agricultural sector. The financing arrangements for the project, based primarily on the needs of all activities in the PMP program, mainly from the work plan arrangements in four areas to consider. Taking into account the PMP plan demonstration to promote integrated pest management technology 12,100 hectares, including 11,100 hectares of crop diseases and insect pests, forest pests and diseases needs of 1,000 hectares. The estimated total budget of 8.883 million yuan, all come from the World Bank project. Detailed cost estimates are as follows (Table 14)


( 10 thousand Yuan )
<table>
<thead>
<tr>
<th>physical control equipment</th>
<th>biocontrol project subsidies</th>
<th>Farmer Training</th>
<th>Resistant variety demonstration and extension</th>
<th>Expert technical assistance</th>
<th>Monitoring Evaluation</th>
<th>Total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>318</td>
<td>261.3</td>
<td>68.7</td>
<td>70</td>
<td>80</td>
<td>90.3</td>
<td>888.3</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Content</th>
<th>Budget ( 10 thousand Yuan )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The implementation of the project</td>
<td>742.0</td>
</tr>
<tr>
<td>1.1 Farmer field school (FFS)</td>
<td>540.0</td>
</tr>
<tr>
<td>1.2 Mobile training team</td>
<td>202.0</td>
</tr>
<tr>
<td>2. The training team building (TOT)</td>
<td>56.0</td>
</tr>
<tr>
<td>3. Monitoring and evaluation</td>
<td>90.3</td>
</tr>
<tr>
<td>Total</td>
<td>888.3</td>
</tr>
</tbody>
</table>

5.4.1 Basic Data Investigation

Cost budget of basic data investigation has been included training campaign.

5.4.2 Assistant Training

Focal point take concentrate training for 21 project villages and town of 6 project cities (counties) 48 project technical principal and vegetable, grapes, cotton, potato and grain crops technical persons (each project county 1 technical principal, every village and town 2 assistants), two times per year, cost budget during project implementation period in due form (2013-2017) is 560 thousand Yuan.

Table 15  TOT Schedule and Budget (2013-2017)

<table>
<thead>
<tr>
<th>Time</th>
<th>Place</th>
<th>Number of Town and Village</th>
<th>Amount of TOT</th>
<th>Number of Students</th>
<th>Counselors Number of TOT</th>
<th>Budget (10 thousand Yuan)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-2017</td>
<td>Project county</td>
<td>21</td>
<td>12</td>
<td>48</td>
<td>6 fruit trees and vegetables graduate counselor</td>
<td>56.0</td>
</tr>
</tbody>
</table>
5.4.3 Farmers Field School (FFS)

Each project village and town crop plant period and growth season conditions, farmers field school conduct 5 times each project year (6 project counties total 60 times), 54 assistants every time (42 project village and town assistants +6 project county technical principal +6 invite provincial level scientific research popularization organization experts). Average training 150 farmers everytime, total training farmers 27 thousand person-time during project implementation period, cost budget is 5.4 million Yuan.

<table>
<thead>
<tr>
<th>Time</th>
<th>Crops</th>
<th>Number of counselors / year</th>
<th>FFS quantity/year</th>
<th>Trained farmers/year</th>
<th>Total budget in 5 years (10 thousand Yuan)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-2017</td>
<td>Fruit trees</td>
<td>54</td>
<td>5</td>
<td>1000</td>
<td>102.5</td>
</tr>
<tr>
<td>2013-2017</td>
<td>Vegetable</td>
<td>54</td>
<td>15</td>
<td>2500</td>
<td>252.2</td>
</tr>
<tr>
<td>2013-2017</td>
<td>Grape</td>
<td>54</td>
<td>5</td>
<td>200</td>
<td>19.4</td>
</tr>
<tr>
<td>2013-2017</td>
<td>Cotton</td>
<td>54</td>
<td>5</td>
<td>150</td>
<td>14.6</td>
</tr>
<tr>
<td>2013-2017</td>
<td>Grain</td>
<td>54</td>
<td>20</td>
<td>1200</td>
<td>110.7</td>
</tr>
<tr>
<td>2013-2017</td>
<td>Seeds</td>
<td>54</td>
<td>5</td>
<td>500</td>
<td>40.6</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>5550 person-time</td>
<td>540.0</td>
</tr>
</tbody>
</table>

5.4.4 Farmers Mobile Training Teams

Everytime four days floating training budget is 30 thousand Yuan. 60 times training total 1.8 million Yuan, includes experts traffic, subsidy, get accommodation, mess, training teaching materials and conference room cost. In 3 years, experts troops will go to project area to help farmers to solve their problems needs cost 220 thousand Yuan. So floating experts training total cost estimate 2.02 million Yuan.

Mainly include experts in transportation, accommodation, meals, training materials preparation and printing, conference room hire experts to give lectures subsidies and other costs.

5.4.5 Monitoring and Evaluation

Inspection work will carry on 5 years. First year focal point is taking basic data investigation select 2 villages from 21 villages of 6 project counties total 42 villages. In which one village will start farmers field school, another village start demonstration and
popularization. Every village basic data investigation budget is 7000 Yuan total 294 thousand Yuan. Trail inquiry data include: output, pesticide use conditions, natural enemy kind crowd growth and decline development in 42 villages. Every village annual 800 Yuan, develop 5 years, total 168 thousand Yuan. Agricultural product pesticide remain inspect, each example 1200 Yuan, average each village and town annual inspect 3 examples, total 378 thousand Yuan in 5 years. Pesticide poisoning conditions investigation carry out in every village, each village and town annual 600 Yuan, total 63 thousand in 5 years. Total inspection budget is 903 thousand Yuan (Table 17).

<table>
<thead>
<tr>
<th>Content</th>
<th>Scope</th>
<th>Budget (10 thousand Yuan)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The investigation of basic data</td>
<td>First year of the six project counties in 42 villages 21 townships</td>
<td>29.4</td>
</tr>
<tr>
<td>2. Tracking survey (yield, pesticide, natural enemies, and so on)</td>
<td>6 counties in 42 villages 21 townships spot checks, 1-2 times per year</td>
<td>16.8</td>
</tr>
<tr>
<td>3. Pesticide Residues</td>
<td>6 counties in 42 villages 21 townships sample of 3 times a year</td>
<td>37.8</td>
</tr>
<tr>
<td>4. Pesticide poisoning</td>
<td>6 counties and 6 counties in 42 villages in 21 townships 1 time a year</td>
<td>6.3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>90.3</td>
</tr>
</tbody>
</table>

6. Public Consultation

Repeatedly solicited for PMP project to further improve the text, in the process of compiling the agricultural administrative departments at all levels of the project area, and the opinions and advice of the technology sector, agricultural associations, and farmers, the provincial agricultural extension sector as well as the World Bank Project Office officials, etc., so that PMP plan more to meet the reality of the project area, in line with the management philosophy of the World Bank project Office.

Public Consultation Feedback Form

<table>
<thead>
<tr>
<th>Time</th>
<th>Place</th>
<th>Provide materials</th>
<th>Participants</th>
<th>The issues raised</th>
<th>How to respond to the issues raised</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011.3-4</td>
<td>6 project counties</td>
<td>According to the World Bank project requirements to provide the</td>
<td>The six projects Comprehensive Agricultural Development Office and</td>
<td>1. Project objectives and scope 2. Projects pest plan framework format file</td>
<td>1. Communication with the World Bank Office reply 2. Reference to existing PMP file</td>
</tr>
</tbody>
</table>

Table 17 Monitoring and Evaluation Budget
<table>
<thead>
<tr>
<th>Year</th>
<th>Location</th>
<th>Activity Description</th>
<th>Relevant Technical Department</th>
<th>Outline</th>
</tr>
</thead>
</table>
| 2011.5-6 | Lanzhou  | Finishing of 6 project counties and PMP PMP draft framework document                 | Comprehensive Agricultural Development Office of Gansu Province and the Gansu Provincial Academy of Agricultural Sciences | 1. The concept of participatory reflect PMP planning is not enough  
2. PMP embodiment too coarse |
| 2011.7-8 | Lanzhou  | Farmers pesticide use questionnaire                                                   | 6 project County plant protection and agricultural extension agents                                | PMP management plan should focus on strengthening the training is particularly important |
| 2012.4-5 | Lanzhou  | Modified PMP plan text                                                               | World Bank Project Office (experts)                                                              | 1. The project does not include pesticide purchase and subsidies to farmers  
2. Check pesticide toxicity (WHO)  
3. Organization chart illustrates the relationship between the current management institutions  
4. Increase farmland forest pest control content |
| 2012.6-7 | Lanzhou  | Modified again PMP plan text                                                         | World Bank Project Office (experts)                                                              | 1. Mitigation measures, monitoring, institutional arrangements and training, implementation and reporting forms are not clear enough  
2. Text is too long |

1. Prepared in accordance with the concept of participatory research  
2. Refine the implementation of the program for each crop establishment
### Annex 1 Schedule of Pest Management

#### A. Mitigation Measures

<table>
<thead>
<tr>
<th>Project activities</th>
<th>Potential environmental and health impacts</th>
<th>Recommended mitigation measures</th>
<th>Responsible agencies / personnel</th>
<th>Cost estimates (10 thousand Yuan)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Publicize IMP concept</td>
<td>1. The farmers are not the proper use, storage and medication overdose</td>
<td>1. Strengthen pest monitoring and forecasting, supervision and regulation of pesticides</td>
<td>1. The city and county PMO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Implementation of the integrated control technology of grain, vegetables, fruit trees, timber and other crop pests</td>
<td>2. Farmers may use high-toxic pesticides, lead to pesticide poisoning</td>
<td>2. Mainly agricultural practices, integrated control, the introduction of biological and botanical insecticides, insecticidal lamps, to reduce the amount of chemical pesticides</td>
<td>2. Cities and counties to promote the station technical staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Application of resistant varieties</td>
<td>3. Farmers may be the remaining the pesticide storage management is lax, resulting in misuse of humans and animals</td>
<td>3. Procurement of physical and biological control appliances</td>
<td>3. Agricultural Concorde demonstration farmers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Implementation of the PMP training program of integrated pest management (counselor training courses, field schools, mobile training team)</td>
<td>4. Farmers may be the lack of knowledge of disease-resistant varieties, disease epidemics, increased medication</td>
<td>4. Disable WHO Class I pesticides (1A, 1B)</td>
<td>4. City and county plant protection stations technical personnel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Farmland and road shelterbelts construction</td>
<td>5. PMP lack of awareness, farmers may lack the integrated pest management knowledge / skills</td>
<td>5. Farmers pesticide storage and use of training to improve the understanding of pesticide management and use policies</td>
<td>5. Mobile training team of experts</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Improper species or the susceptible cultivar easy to caused biological invasions harm; Hexi the farmland shelterbelts might pest management problems exist</td>
<td>6. Contact with local quality supervision departments to strengthen the demonstration area of pesticide sales and use regulatory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7. Provide PMP training for farmers, technical staff, the pesticide sales staff, county and city projects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8. Prohibited the use of non-quarantine sick species; establish a rational species structure, avoid simplification; develop perform shelternets pest control methods</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Refer to Table 14-2