Appendix 3

World Bank Loan
Sustainable Agricultural Projects under World Bank Loan Scheme in Jiangxi, China

Pest Management Plan

Jiangxi Comprehensive Agricultural Development Office

August 2012
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1 Project Overview

Through developing sustainable agricultural projects under the World Bank loan scheme, Jiangxi Province aims to utilize the platform and intellectual resources of international financial organizations to learn from advanced international agricultural development concept and management tools, to improve the basic conditions of agricultural production, improve agricultural adaptation and response to climate change, achieve the sustainable development of agriculture. The project will be carried out in 32 townships from 6 counties (cities, districts and counties) including Gao’an, Yushui, Jinxian, Xingguo, Anfu and Jinxi, covering farmland area of 309.6 km². The project is mainly focused on the infrastructure construction including improving canal and irrigation system, land leveling and soil fertilization to improve the farming conditions for rice, rapeseed, vegetables and other crops, improve production levels, and enhance disaster prevention and mitigation capabilities. The total sewing acreage of rice, rapeseed and vegetables in the project implementation period will be increased by various degrees but this may also lead to the expansion of pests and diseases on the crops or the arising of new pests and diseases, therefore we shall pay more attention to adopt sustainable agriculture technology during the process.

Based on the requirement of World Bank’s *Environmental Assessment of Pest and Disease management OP/BP4.09* and the *Pest and Disease Management* regulations, combined with the pest/disease status of the project area and new issues that may arise from the project implementation process, we have developed an overall Pest and Disease Management Plan (PMP) mentioned earlier in Clause 2.4 of the General Implementation Plan. PMP will encourage farmers to adopt environmental friendly agricultural practices and integrated pest management (IPM) technology, provide technical assistance, training to farmers, equipment procurement, monitoring and evaluation so as to improve the quality and safety level of agricultural products. The priorities are as follows:

- To build 10-15 demonstration sites in the project area for IPM introduction and promotion, including the establishment of the pest monitoring plan, killing pests through solar insecticidal lamp and strengthening the forecast of agricultural pest.

- To introduce bio-pesticide and botanical pesticides for demonstration. To reduce the use of highly toxic chemical pesticides by 20% and increase bio-pesticides by 15%, so as to reduce the adverse effects of chemical pesticides on the environment and human health.

- To provide training to county level technical promotion personnel and project office to improve their understanding of the pest management plan (PMP) in forms of training to trainers, farmers field schools and farmers’ mobile training teams; to provide training on pesticide storage and use to the farmers to improve their awareness of pesticide use and management regulations, and improve their practical skills; to train farmers on integrated pest management skills.
IPM supervision committee and expert advisory group at provincial level will be established for the effective implementation of the plan. Project office will be set up and dedicated person will be assigned for project implementation and management at each project city or county.

PMP plan is comprised by five parts: project overview, project background, integrated pest management plan, implementation plan and cost allocation. There will be 10,062 hectares under this pest control scheme with estimated cost at about RMB 31.951 million.

2. Project Background

2.1 Project Objective

Jiangxi sustainable agricultural projects under World Bank loans targets to improve agricultural adaptability to clime change through high-standard farmland construction and supporting agronomic measures led by water conservancy facilities to ensure sustainable agricultural development; encourage farmers to use fine seed and good practices; design a set of integrated pest management (IPM) skills according to local conditions to mitigate adverse impact of pests and diseases on crops and avoid potential drug poisoning during the implementation of the project due to potential increased use of pesticides; improve agri-products quality and keep the risk of pesticides on human health and environment to the minimum level; ensure a safe environment and at the same time realize continuous growth in agricultural production, rural incomes and sustainable agricultural development.

2.2 Pest and Disease Outbreak Status in Project Area

2.2.1 Current Agricultural Production Status in the Project Area

Jiangxi Province is located near the Tropic of Cancer, at the south bank of the mid-lower reach of Yangtze River, 24° 29' N-30° 04' N, 113° 34' E-118° 28' E, covering a land area of 166,900 km², with arable area of 43 million mu. The province is mainly in the landform of mountains and hills. With good ecological environment and forest coverage rate over 60%, Jiangxi is one of the major grain producers in China. Rice is the main crop in Jiangxi, growing area stabled at about 50 million mu in recent years. Oil crop is the second-largest right next to rice with sewing area of 10 million mu.

The project area covers 6 cities (counties), 32 townships (towns), 169,000 rural households, 607,000 rural population and 46,167.6 hectares of arable land. The crop rotation patterns in the project counties are oil-rice- rice and oil-vegetable-rice. Major crops in the project area are rice, rapeseed and vegetables, with total sewing area of 89,850.8 hectares, among which 68,416.8 hectares are grain crops and 21,434 hectares are cash crops.
### Table 1 Major Crops and Sewing Area in Project Area (hm²)

<table>
<thead>
<tr>
<th>Project Counties</th>
<th>Grain Crop</th>
<th>Cash Crops</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rice</td>
<td>Vegetable</td>
<td>Rapeseed</td>
</tr>
<tr>
<td>Gao’an</td>
<td>7347.8</td>
<td>720</td>
<td>2018</td>
</tr>
<tr>
<td>Jinxian</td>
<td>7240</td>
<td></td>
<td>1810</td>
</tr>
<tr>
<td>Yushui</td>
<td>5268</td>
<td>1245</td>
<td>831</td>
</tr>
<tr>
<td>Xingguo</td>
<td>16660</td>
<td>830</td>
<td>5802</td>
</tr>
<tr>
<td>Anfu</td>
<td>16548</td>
<td></td>
<td>3304</td>
</tr>
<tr>
<td>Jinxi</td>
<td>15353</td>
<td>1228</td>
<td>3646</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>68416.8</td>
<td>4023</td>
<td>17411</td>
</tr>
</tbody>
</table>

For rice cultivation, soil tillage is generally done through machines. Rice seedling bed is surrounded by water and covered with plastic film. Early rice transplantation to the field is mostly done by seedling throwing. Irrigation relies on gravity irrigation on the ground. The farmland infrastructure in the project area is quite weak. Although ditches, drainage and roads are there, they are not fully developed. Water sources mainly come from rivers (lakes), sometimes from well in some area, which is plenty to meet the irrigation needs in the project area and also meet the water quality to produce pollution-free agri-products.

#### 2.2.2 Analysis on Major Pests and Diseases in the Project Area

(1) Pests and Disease Types
Major pests on rice are rice stem borers (incertulas and Chilo suppressalis), rice plant-hoppers (S. furcifera and Nilaparvata lugens), leaf roller and gall midge. Major diseases on rice are blast, sheath blight, false smut, Southern Rice black-streaked dwarf disease.

Major pests on rapeseed are aphids which affect the seedling stage in autumn and bolting stage in spring. In seedling stage, victim plant shows yellow leaves, poor growth and even withering to die in severely infected cases. Fall-off of buds or flowers, shrunken grain are seen in rape seed affected in bolting stage. Major diseases are Sclerotinia sclerotiorum, downy mildew, anthracnose and blight, etc.

Chili peppers and pakchoi cabbage are two important vegetables in the project. The black cutworm is the major pest in pepper growing season and aphids, cotton bollworm and red spider are major pests in pepper fruiting season. Major pests on pakchoi cabbage are aphids, beet armyworm, spodoptera litura, diamondback moth and cabbage caterpillar. Major diseases are downy mildew, gray mold, anthrax, blight, powdery mildew, etc.

Generally, downy mildew is popular at 18-22 °C with relative humidity of over 80%. In early spring when the weather is dominated by “more cloudy less sunny” days, the disease...
spreads rapidly and it can make the whole plant withered in 1-2 weeks. Powdery mildew and blight more likely occurs in hot and humid environment. And powdery mildew mainly occurs in the later stage of the crop.

Pests and Diseases that are often seen on Major Crops:

Table 2 List of Major Pests and Disease on the Crops in Project Area

<table>
<thead>
<tr>
<th>Crop</th>
<th>Major Pests</th>
<th>Major Disease</th>
<th>Drugs Commonly Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>rice stem borers (incertulas and Chilo suppressalis), leaf roller, rice hoppers</td>
<td>Rice Blast Disease, Rice Sheath Blight, Rice False Smut, Southern Rice Black-streaked Dwarf Disease</td>
<td>Avermectin, Validamycin, Chlorpyrifos, bisultapm isoprothiolane, Difenconazole, Propiconazole, isoprocarb, tricyclazole</td>
</tr>
<tr>
<td>Rapeseed</td>
<td>aphis</td>
<td>Sclerotium Disease, Downy mildew, anthrax, blight</td>
<td>Imidacloprid, Triadimefon, carbendazim, etc.</td>
</tr>
<tr>
<td>gourd and vegetable</td>
<td>Soil pests, Diamondback moth, cabbage caterpillar, aphis</td>
<td>Downy mildew, gray mold, anthrax, blight, powdery mildew</td>
<td>Phoxim, Avermectin, carbendazim, chlorothalonil, mancozeb, flowable sulfur complex, Copper(II) hydroxide etc.</td>
</tr>
</tbody>
</table>

(2) Damage Level and Loss Caused by Major Pests and Diseases
In the recent years, rice sheath blight, striped stem borer and yellow stem borer break out all year round on rice with a mid-high damage level. Damage of migratory pests such as white-backed plant-hopper, brown plant-hopper and rice leaf roller are correlated to the migrated pest amount. An increasing damage is seen year on year. Rapeseed planting is affected by weather conditions. Each year in March and April, with extra rainfall and raining days, rapeseed is vulnerable to sclerotinia sclerotiorum, downy mildew, viral diseases, vegetable aphids etc. The outbreak of these diseases and pests is generally maintained at a level 3-4. Vegetable pests and diseases, especially gray mold, downy mildew on greenhouses vegetables and other facility-supported vegetables become more and more serious which has turned into a main constraint to vegetable production. In case of production with inadequate disease and pest control, output reduction would be as much as 20-30% and could be 50% in most severe cases. Taking 2010 as an example, rice, rapeseed and vegetable suffered various extent of yield reduction. Xingguo and Jinxian County were stricken by severe loss, up to 5.52 million Kg and 4.65 Kg of loss respectively on rice alone. Loss from major pests and diseases in 2010 is shown in Table 3.
Table 3  Loss on Major Crops in 2010 Due to Pests and Diseases (10,000 Kg)

<table>
<thead>
<tr>
<th>Project County</th>
<th>Food Crops</th>
<th>Cash Crops</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rice</td>
<td>Rapeseed</td>
</tr>
<tr>
<td>Gao’an</td>
<td>200</td>
<td>2</td>
</tr>
<tr>
<td>Jinxian</td>
<td>465.12</td>
<td>117.76</td>
</tr>
<tr>
<td>Yushui</td>
<td>104.3</td>
<td>10</td>
</tr>
<tr>
<td>Xingguo</td>
<td>552</td>
<td>82.6</td>
</tr>
<tr>
<td>Anfu</td>
<td>180</td>
<td>9</td>
</tr>
<tr>
<td>Jinx</td>
<td>44</td>
<td>22</td>
</tr>
</tbody>
</table>

2.3 Pest and Disease Management Status and Issues
The project area’s economy is in mid- low level among the project counties. Pest and disease control area is only accounted for about 80% of the total sown area and control level is relatively low. The control level has big differences among the project counties. Among which, Yushui, Gao’an and Jinxian embrace high control level at about 90%, while the rest of the counties are between 70-80%. The overall pest control measures mainly focused on agricultural physical control and chemical control (Table 4). Chemical control is still the effective main control method, occupying more than 90% while physical control is less than 10%.

Table 4  Major Pest and Disease Control Measures Adopted in Project Area

<table>
<thead>
<tr>
<th>Control Method</th>
<th>Measures</th>
<th>Applicable Crops</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>To select anti-disease and pest resistant varieties and seedlings</td>
<td>All Crops</td>
</tr>
<tr>
<td>Agricultural</td>
<td>plastic film mulching</td>
<td>Vegetable and Cotton</td>
</tr>
<tr>
<td>Physical Method</td>
<td>Crop rotation</td>
<td>All Crops</td>
</tr>
<tr>
<td></td>
<td>Field cleaning</td>
<td>Fruit and vegetable</td>
</tr>
<tr>
<td></td>
<td>Pasteurization and killing pests with hot temperature; Greenhouse fumigation in hot summer</td>
<td>Vegetable</td>
</tr>
<tr>
<td></td>
<td>Seed blending or coating with chemicals</td>
<td>Rice and Rapeseed</td>
</tr>
<tr>
<td>Chemical Method</td>
<td>Sowing chemicals under furrows (holes); broadcast poisoned soil</td>
<td>Fruit, vegetable and rapeseed</td>
</tr>
<tr>
<td></td>
<td>Kill pests with poisoned bait or traps</td>
<td>All crops</td>
</tr>
<tr>
<td></td>
<td>Spray chemicals on plant top or root irrigation</td>
<td>All crops</td>
</tr>
</tbody>
</table>
2.3.1 Integrated Pest and Disease Management

In pest control, farmers in the project area fully understand that the fundamental measures of pest and disease control is to select and use resistant varieties, adopt crops rotation and other agricultural physical measures. Other than that, they mostly rely on chemical pesticides. Biological control methods are seldom used. When pest and disease occurs, pesticide is the first thought to control the outbreak. Yield and profit is the first priority of farmers. Pesticide residue is not yet given enough attention as it is invisible and intangible. Only when poisoning to human and livestock occurs, do farmers realize the importance of reasonable application of pesticides.

In the project area, most farmers are lack the necessary integrated pest management knowledge to control pests with biological, ecological and physical control measures. Few of them are aware of scientific using of chemicals. Only a handful of farmers understand the concept of integrated pest management (IPM), but they do not know the IPM technology systems and work procedures. Under this situation, it is difficult to adjust the agricultural structure, adopt pollution-free production and realize sustainable development. Training to farmers should be strengthened on biological and ecological control, physical prevention and pest luring technology to maximally reduce and replace the use of chemical pesticides.

2.3.2 Agronomic Control Measures

- To select resistant varieties. It is one of the most effective, economical and easy ways to control disease and pests. It is also one of the most commonly adopted control measures.
- Crop rotation. Most farmers believe that continuous growing the same crop is an important reason to trigger and exacerbate pest and disease outbreak. Crop rotation can deteriorate the nutritional conditions of many diseases and unitary-feeding or specified-feeding pests, which can effectively prevent the spread of these diseases and pests to reduce damage.
- Water-saving technology. The farmers are generally capable of conducting irrigation based on status of weather, land and crops to avoid excessive humidity caused by flood irrigation which may trigger the occurrence of diseases.
- To clear sick plants. Strengthen field management, timely remove infected branches and leaves, fruits or sick plants; take them out of the field, bury or burn them together to reduce infection source.

2.3.3 Chemical Control Method

The pest and disease control level in the project area is comparatively low and excessively relying on chemical drugs. Based on typical survey, in the area with low control level, organophosphorus pesticides accounted for 50-60% of the total amount of rice pesticides, 20% of the total amount of vegetable pesticides. The wide use of organophosphorus pesticides was confirmed by field surveys and household interviews during the project preparation stage. Household interviews show that many farmers know many organophosphorus pesticides are extremely dangerous, but they still use these pesticides because they are inexpensive, effective and labor-saving. There are no other alternative
substitutes.

Survey on pesticides application in the project area shows:

a) The amount of dimehypo and organophosphorus pesticides applied on rice exceeds national standard (GB4285-89). For instance, dimehypo is applied with a dosage of 250 ml per Mu.

b) According to the China Pesticide Application Regulation, highly toxic pesticides are prohibited on vegetables, tea, fruit and herbal medicines.

c) 100% farmers use herbicide but most of them don’t know the adverse impact herbicide can do to soil and underground water.

From the investigation so far, chemical drugs are most commonly used by farmers on pest and disease control. Other control methods are less used.

Table 5 Types of Chemical Drugs and Dosage for Various Crops in the Project Area

<table>
<thead>
<tr>
<th>Crops</th>
<th>Pesticide Types and Application Percentage</th>
<th>Dosage (kg/hectare)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>Organophosphorus Pesticide 50%, dimehypo 90%, pyrethroid pesticide 80%, herbicide 90%, fungicide 80%</td>
<td>7.5</td>
</tr>
<tr>
<td>Late Rice</td>
<td>Organophosphorus pesticide 50%, dimehypo 90%, pyrethroid pesticide 80%, herbicide 80%, fungicide 100%</td>
<td>10.5</td>
</tr>
<tr>
<td>Vegetable</td>
<td>Organophosphorus pesticide 20%, pyrethroid pesticide 90%, fungicide 100%</td>
<td>7.5</td>
</tr>
<tr>
<td>Rapeseed</td>
<td>Pesticide 20%, herbicide 50%, fungicide 70%</td>
<td>1.5</td>
</tr>
</tbody>
</table>

2.3.4 Major Issues in Pest and Disease Management

(1) **Farmers have generally low education level and are lack of technical guidance. They tend to apply pesticides blindly.** This is demonstrated in three ways. Firstly, they apply unnecessary drugs just for playing it safe, no matter there is infection or not. They just apply drugs every now and then. This increases drug cost and consumes labor. Secondly, farmers often apply drug too late. Farmers pay more attention in curing the disease than preventing it from happening. So they only spray drug when they see severe diseases outbreak. Thirdly, farmers sometimes don’t know the right drug for the right disease or pest. For example, some farmers try to use anti-virus drugs to cure yellow dwarf disease and some others use pesticide for disease.
Due to lack of general technical support, most farmers have to consult drug dealer for advice to solve their problem. However, drug dealer only giving profit-driven advices rather than good advices about real effective and low-input and low-toxic chemicals. Farmers don’t know the right timing for pest/disease control, so they cannot prevent pest and diseases through regular drug spraying.

(2) **Huge quantity of highly-toxic drugs is used.** Organophosphorus pesticides are welcomed and popularly used by the farmers for their large production volume, low cost and good effect. But farmers are lack of knowledge and the understanding of all kinds of drugs. There for overdose and drug abuse of these highly-toxic drugs are very common in the actual practice especially on cash crops such as vegetable and fruits. Most people don’t know which drug is banned and which drug is allowed to use. They just use whichever is cheaper no matter how poisonous the drugs are.

(3) **Single mode of drug use and lack of knowledge of pesticide pollution.** Drugs are mostly applied through spraying, accounting for 80% of the total application. Drug utilization rate is very low. Farmers don’t have enough awareness of acute poisoning from highly-toxic drugs and don’t have any awareness of chronic poisoning cased by drug accumulation in human body. Driven by high profitability, some farmers violate the law and illegally use banned highly-toxic drugs.

(4) **Farmers have slow acceptance to new pesticides, especially biological pesticides.** Firstly, biological pesticides take effect slower than chemical pesticides, so farmers believe that biological pesticides are ineffective. Secondly, new drugs are more expensive than old drugs. But farmers never understand that “expensive stuff is actually cheaper for use” (new pesticides are generally more efficient, last long, reduce application frequency and reduce cost).

(5) **Poor management of drugs.** Pesticide market is not strictly monitored and managed. Some regulations failed to play its role in banning the application of highly toxic drugs onto vegetables and fruit trees. Pesticides with high toxicity and high residue are still used by farmers and they are still the major drugs for most of the disease and pests. Drugs and other chemicals for agricultural use are not kept and stored properly. Chemical wastes and packaging is not properly disposed.

Based on overall analysis, chemical drug application in the project area still faces issues as below:

(1) Excessively rely on chemical drugs, especially in the production of high profitable and high value crops such as vegetable, gourd, fruit and cash crops;
(2) Chemical drugs especially pesticides are used increasingly year on year;
(3) Lack of proper using and management on chemical drugs (fungicide, pesticide and herbicide) and other drugs;
(4) Randomly dispose leftover drugs, wastes and packaging materials which creating polluting and poisoning risks;
(5) Agricultural promotion agencies, drug distributors and farmers don’t have enough awareness of integrated pest and disease management;
(6) Lack of timely and adequate information about chemical drugs.

2.4 Evaluation of Current Policy and Regulations

2.4.1 Current Policy and Regulations
To strengthen pest and disease management, the following law and regulations are to be followed:


(2) *Agricultural Drug Management Regulations of PRC* (issued by the State Council, effective from 8 May, 1997, revised on 29 November, 2001).

(3) *The Implementation Measures of Agricultural Drugs Administration Regulations* (issued on 27 April, 1999 by Ministry of Agriculture, revised on 8 January, 2008).

(4) *Administration Measures of Pollution-free Agri-products* (issued in 2002 by the Ministry of Agriculture, General Administration of Quality Supervision, Inspection and Quarantine).

(5) *Management Regulations for Agricultural Drugs with Limited Usage* issued on 01 Aug, 2002 by Ministry of Agriculture; the regulation was established based on Agricultural Drug Management Rules to manage the limited using of drugs.

(6) *Agricultural Drug Safe Application Standard* (GB4285-84) and *Agricultural Drug Proper Operation Standard* (GB/T8321.1—GB/T 8321.7). The standards have regulated the application dosage, frequency, safe intervals, maximum drug residue and notices.


(8) *Notice of Forbidding the Use of Highly Toxic Pesticides* (Animal Drugs) *Chlordimeform and Clenbuterol* issued by Jiangxi Agricultural Department (effective form June, 2002)

(9) *Operation Procedures on “Safe” Production of Tomato, Pepper, Eggplant, String Bean, Cucumber, Chinese Cabbage, Pakchoi and Cabbage* issued by Jiangxi Plant Protection and Inspection Station in the recent years.

2.4.2 Current Plant Protection Policy in China
Chinese government attaches great importance to the pest and disease control work, emphasizes the policy of "prevention-oriented, scientific prevention and control, abide by
the law and promote health” and gradually adopt biological control method as the major control approach in the future.

Government policy aims to keep the pest density (refers to the degree of harm) at low level to improve the yield and safety of agricultural production. The purpose is to protect agricultural resources and ecological environment. When pest and disease outbreak severely and other control methods cannot take effect, the application of chemical pesticides is unavoidable. Pollution-free, high efficient and low toxic chemical drugs can be used to control the outbreak.

Pest and disease control should follow “prevention-oriented, integrated management” guidelines; place equal importance to pest control, ecological environment and safety of agricultural products. People’s government at provincial and city (county) level should strengthen the leadership on pest and disease management in its administrative territory; enhance organization construction of plant protection institutions; agricultural departments above the county level shall be in charge of pest and disease control work in its administrative territory. Its plant protection organizations specifically undertake the pests and diseases monitoring and forecasting and also provide drug application safety guidance and supervision. The state provide subsidy for major agricultural pest and disease control project.

The Chinese government has given great attention to the safety of food. "Agricultural Drug Management Regulations (promulgated by the Chinese government), the Safe Application Standard of Agricultural Drugs (issued by Ministry of Agriculture) clearly stated:

- a list of chemical drugs which are suitable for pests and diseases control;
- A list of efficient, low toxic and low residue chemical drugs. They are recommended to use only when non-chemical control method failed.
- agricultural products with chemical residue exceeding the standard are not allowed to enter the market;
- Method of safe use of chemical drugs

Agricultural Drug Management Regulation encourages the use of efficient, low toxicity and low residue drugs and regulated their sales standard. Some chemical drugs such as Parathion, monocrotophos and phorate are banned as regulated in the Drug Safety Application Standards and Agricultural Drug Management Regulations.

2.5 Pest and Disease Management and Policy Framework

PMP supervision organizations consist of agricultural drug supervision agency, pest prevention and control agency and drug residue inspection agency. Table 6 shows the job description of various units after the project is implemented in drug market management, during and post agricultural production.
## Table 6 Duties and Job Description of various Units

<table>
<thead>
<tr>
<th></th>
<th>Government</th>
<th>Technical Department</th>
<th>Farmer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Supervision on pesticide Market</td>
<td>To organize cross-department cooperation between Industry and Commerce Bureau and agricultural law enforcement authorities to carry out regularly inspection to agricultural inputs markets to eliminate counterfeit drug sales and prohibit sales of highly toxic pesticides to vegetable and fruit production.</td>
<td>To assist government departments to carry out a market survey of pesticides and investigation on the drug use status in the fields.</td>
<td>To buy pesticides under the guidance of the local technical staff and reduce the purchase of highly toxic pesticides.</td>
</tr>
<tr>
<td>2. Manage the process of agricultural production</td>
<td>Issue, examine or revise the Banning List of highly toxic pesticides or Limited-Use-Registration based on the standard of World Bank, FAO and European Union; Establish more rigorous rules on the use of pesticides and prohibit the use of highly toxic pesticides on fruit and vegetable crops; reduce the permit registration for production of highly toxic pesticides to enterprises; strengthen the supervision of seeds, seedlings trans-provincial transportation for forestry and agricultural production.</td>
<td>To strengthen training and instructions to farmers on daily pest and disease control, guide them take the advantage of low toxicity chemical drugs, bio-pesticides and other methods for pest and disease control.</td>
<td>To participate in agricultural technology training, apply drugs under instructions of technical personnel and absolutely avoid using of highly toxic pesticides on crops.</td>
</tr>
<tr>
<td>3. Management of agricultural products after coming to market</td>
<td>To establish agricultural product recall system; strengthen the market supervision and inspection of pesticide residues in agricultural products; encourage farmers to produce green, pollution-free and IPM food; build sustainable market system with good product quality and price; attract farmers to consciously adopt IPM measures with price advantage on good quality products;</td>
<td>Encourage farmers to conduct agricultural production with IPM measures, help farmers to apply for the registration of green food, pollution-free and organic food.</td>
<td>Join in farmers' associations, sign contract with leading enterprises, register for green food, pollution-free food or organic food; actively adopt IPM measures to produce</td>
</tr>
</tbody>
</table>
encourage leading agricultural enterprises to sign orders with farmers.

value-added agricultural products.

Pesticides used in the project area must meet national standards, industry standards or enterprise standards. Pesticide packaging, transportation and storage are indispensable part from pesticide production and consumption. The pesticide packaging should comply with the related regulations specified in there National Standards issued by State Bureau of Technical Supervision, namely, GB3796-85 General Clauses of Pesticide Packaging, GB4838-84 Packing for pesticides of emulsifiable concentrates, GB5736-85 Calcareous Plastic Corrugated Boxes. The pesticide transportation shall comply with national Poisoning-Proof regulations for Storage, Transportation, Sales and Application of Pesticides. The transportation shall meet the general requirements of the Clause 3 of the Safe Use of Agricultural Chemicals.

The state laws and regulations on pesticide production, packaging, storage, transportation, sale and use still have gap with that of the international laws and regulations. Agricultural Chemicals management in Jiangxi faces similar issues with other provinces of the country, mainly manifested in the area of not enough supervision, use of highly toxic pesticides, overdose of pesticides, not complying with state-regulated drug application intervals.

In order to deal with pest and disease risks after the implementation of the project and help farmers effectively control its damage without increasing the environmental and agricultural pollution caused by pesticides in the project area, it needs the common efforts from the government, technical staff and farmers.

Agricultural Agricultural Chemical Supervision Organizations:
Responsibility of Each Division:

Agricultural Department: Local agricultural development planning, management of related agricultural affairs

Bureau of Industry and Commerce: Administration on the market of agricultural chemicals

Quality Supervision Bureau: Management on the production processes of agricultural chemicals

Agricultural Chemical Inspection Bureau: Handling pesticide registration application, pesticide application and supervision, establish or participate in the promulgation of National or industrial standards on the safe application, quality and residue content of agricultural chemicals.

Agricultural law enforcement organization: Supervision and management of the agricultural chemicals quality and market.

Township Integrated Agricultural Technical Service Center: Assist and coordinate with agricultural law enforcement and technical organizations to carry out technical promotion, training and guidance on pesticide management and integrated pest and disease control.

Pest and Disease Control Organizations:
Responsibility of Each Division:

Provincial Agricultural Department: Overall Management on all agricultural related works. In charge of agricultural administrative units at all levels of the province, organize pest and disease control work.

Provincial Plant Protection and Inspection Station: plant disease detection, release long-term, mid-term and short-term pest and disease forecast on regular basis; emergent prevention and ongoing control of major pest and disease hazard, promotion of new pesticide, equipment and safe use of agricultural chemicals, training to farmers on pest and disease management techniques.

Provincial Agricultural Technology Promotion General Station: to assist Agricultural Department on related management and in charge of technology promotion.

Provincial Cash Crops General Work Station: Cultivation plan, technology promotion and pest/disease management of vegetable, fruit trees and herbal plants in the whole province.

City (county/district) Agricultural Technology Promotion Center: agricultural technology promotion in its administrative territory; organizing, planning, coordinating, supervising, decision making for the pest and disease control work.

City (county/district) Plant Protection Station: Organizing, managing, guiding and supervising the pest and disease control in its administrative territory; assisting and coordinating with related law enforcement and technical departments to carry out promotion, training and instruction for local pesticide management and IPM techniques.

Township Agricultural Technical Station: Major pest and disease detection and forecast, providing on time instructions on the pest and disease control.

Agricultural Cooperative and Farmer’s Association: Organizing and carrying out local pest and disease control work.

Agricultural Chemical Residue Inspection Institution:
Responsibility of Each Division:

Provincial Agri-products Quality Safety Inspection Center: Supervising the agri-product quality and safety in the whole province and guide the agri-product supervision work at city, county (district) level.

Agri-products Quality Inspection Center (Station) of each county: supervision and management on the agri-product quality and safety at local level.

Agri-products Quality Inspection Station at wholesale market and supermarket: quality inspection for the agri-products accessing to market (supermarket).

Agri-products Quality Inspection Site at production base: quality inspection on agri-products releasing from the production base.

3. Integrated Pest and Disease Management Plan

3.1 Project Target
The Pest and Disease Control Plan will be implemented only in 32 townships (towns) of 6 cities (counties) including Gao’an, Yushui, Xingguo, Anfu, Jinxi, and Jinxian, covering 169,000 rural households, 607,000 rural population and 46,167.6 hectares of arable land. Integrated pest and disease management measures will be implemented in 10,062 hectares to improve the standardization level of comprehensive pest management. It is targeted to reduce the use of highly toxic chemicals by 20% in the project area, increase the use of biopesticide which passed risk evaluation and product registration by 15% and keep the loss caused by pests and diseases under 8%.

The work plan focuses in the following aspects:

1) Introduce and promote stress resistant new variety, adjust crop cultivation structure and reduce the outbreak frequency of pest and disease;
2) Introduce solar trap lights and biopesticides and pesticides of plant origin to take place of hazardous chemical drugs in demonstration field, reduce the harmful impact of chemical drugs to environment and human health.
3) Promote IPM techniques in project area (towns and townships) to improve farmers’ comprehensive pest/disease control skills through field school or on-site training.
4) Provide training to technical staff in the technical promotion station at County (City), town or village level and county (city) project offices to enhance awareness of IPM. Provide training to farmers on agricultural chemical storage and application so as to improve their awareness.

3.2 Content of IPM Plan
For the sustainable agricultural projects in Jiangxi province supported by World Bank loan, the integrated pest and disease management plan will be targeted to specific crop in various townships. Try to maximally adopt integrated measures combining agricultural, physical, biological and chemical control measures. Technical training, demonstration and result
monitoring will be strengthened to reduce the reliance of the agricultural production to chemical drugs.

3.2.1 Concept of PMP Plan
PMP plan is to carry out integrated pest and disease control which is targeted to control harmful creatures, improve safety level of agri-products, protect ecological environment, and improve farmers’ quality, reduce the reliance on chemical pesticides and keep the pest damage under economic limit. Its core contents are (1) Control pests but not kill pests; (2) try to use non-chemical measures to keep the pest quantity at low level; (3) when chemical drugs are unavoidable, try to keep the impact of the pesticide to environment and human being at minimum level; (4) Establish standard IPM technical system based on the local conditions, combining agricultural, biological, ecological, physical control measures and pest trapping techniques to maximally substitute or reduce the use of chemical drugs and avoid killing pest predators and environment pollution so as to keep the pest/disease damage under durable level.

3.2.2 Major Activities
IPM will do a good job in the pest and disease forecast utilizing the current forecast system. Once pest or disease occurs, agricultural control measure should be firstly considered, physical and biological measures secondly considered. Chemical drugs shall be lastly adopted only when all other control measures are failed and the pest/disease damage exceeds the economic threshold. When chemical drugs are applied, attention shall be made to select pollution-free drugs to reduce the drug resistance of the pests and avoid pollution to the environment.

(1) Strengthen the pest forecasting.
Establish monitoring point in two project sites of each project county by the local plant protection personnel who are familiar with the local conditions and regularly carry out pest monitoring and forecasting (also responsible for the monitoring of chemical pesticide survey). Provide pest forecast and prevention information to farmers together with the information from County Plant Protection and Inspection Station, including the control object, the right control period, control techniques, drug variety to improve control effect and reduce using amount of pesticide.

(2) Agronomic Control
Based on the specific conditions of the six project counties, specific agricultural control measures are to be adopted.
Selection of resistant varieties: to select superior variety to give a full play of its potential genetic resistance and establish bio-diversity.

(3) Physical Control
Trap and Kill moths, beetles and the imago of orthoptera pests with solar insecticidal lamps.
(4) Biological Control
To use biological agents such as Bt emulsion Liuyangmycin, nuclear polyhedrosis virus, Beauveria bassiana, kasugamycin, Validamycin and so on.

(5) Chemical Control
Combined chemical control and other control measures are efficient way to improve the control effectiveness and protect crop harvest. It requires high quality drugs with good effect which is non-toxic or low-toxic to humans and animals and safe to crops. The main chemical control measures include:

① Strictly prohibit the use of deadly and highly toxic pesticides or pesticides with high residues.
② Use pesticides specified for different pest, disease and weed types; apply according to indications
③ According to the pests and diseases outbreak stage, apply drugs on time and with the right amount.
④ Alternative use of pesticides, strictly avoid the safe harvest intervals.
⑤ Strict implementation of safety harvest intervals.

3.3 Expected Results from PMP Project

Pest and disease control on major crops in the project area adheres to the principle of "prevention first, integrated and green prevention and control”; select proper and effective control techniques and drugs with small negative effects based on the types of crops and pests/diseases; encourage agricultural, biological and physical measures and minimize chemical drug control area and application frequency. the choice of a suitable, efficient, small negative impact on the prevention and control technology and Pharmacy; encourage the use of biological pesticides; select low toxic and low residue pesticides based on the types of crops, pests/diseases and resolutely eliminate the use of highly toxic and high residue pesticides.

3.3.1 Rice
- reduce the pest/disease caused yield loss under 8%;
- reduce the use of chemical drugs by over 20%, chemical drug application to be controlled within 2-2.5 times;
- eliminate chemical drug poisoning accident during production;
- ensure the safety of chemical drug storage and its waste disposal;
- Increase the amount of paddy pest predators (spiders, frogs, etc.).

3.3.2 Rapeseed
- reduce the pest/disease caused yield loss under 8%;
- reduce the use of chemical drugs by over 20%,
- eliminate chemical drug poisoning accident during production
- maintain biodiversity in the field and reduce the amount of pests

3.3.3 Vegetable
- reduce the use of chemical drugs by over 30%,
• chemical drug residue in vegetables meet state standard
• eliminate chemical drug poisoning accident during production
• maintain biodiversity in the field and reduce the amount of pests
• aphis: less than 5 on single plant
• tobacco budworm, black cutworm and red spider: plant infected rate 2%

4. PMP Implementation Plan

4.1 Implementation Organization Setting and Responsibility

4.1.1 Organization Setting
Jiangxi Province will set up Integrated Pest Management Supervision and Steering Committee and Expert Advisory Group. Supervision and Steering Committee are formed by people from provincial project office and relevant departments. The Expert Advisory Group is composed of experts from provincial and county level scientific research and promotion institutions (plant protection stations and agricultural technology promotion stations). Each project county will set up project office to provide assistance to the implementation of the IPM program. At the same time, project offices at all level will hire professional organization to establish Pests and Diseases (agricultural pollution source) Monitoring Group which is made up with technical personnel from the hired agencies and local plant protection staff of each project county.

4.1.2 Stakeholder Responsibility

**Supervision and Steering Committee:**
• examine the demonstration farm in the project area
• supervise the implementation of pest/disease control projects
• coordinate the activities of city/county project offices and project construction units

**Expert Advisory Group:**
• make pest management plan for the project area
• provide technical support to pest/disease management work
• assist provincial project office to conduct supervision and evaluation to the project implementation
• assist plant protection station at city/county level to conduct a technical review to the project in order to decide whether to provide financial support
• provide technical support to the technical issues of the Pest/disease management plan
• participate in the training to the project personnel;
• help to organize study tour or other training activities;

**Project Office at County Level:**
• responsible for the selection of demonstration farm in the project area
urge the project implementation units to follow the pest/disease control plan and supervise project implementation;
coordinate with agricultural technology promotion and project construction units and help to organize training and study tour and other activities

**Pest and Disease Monitoring Group:**
- set up monitoring points and determine monitoring scheme in the project area
- monitor and forecast the pest/disease status
- monitor the use of chemical pesticides.

4.2 Capability Strengthening

4.2.1 Technical Training

Training is an important approach to strengthen pest/disease management capability. According to the job division and levels of the people involved from various departments, training will be given to the technicians at provincial, city, county and township level under the training scheme. The pest/disease management training will include the following aspects:

- **Periodical pest and disease control training to the technicians at county and township level,** including PMP method against specific crop/pest and disease to ensure the effective implementation of pesticide management regulations.

- **PMP training to farmer on pest/disease control new methods for specific crops** through field school on time and on regular basis.

- **Compile and distribute PMP training material.** It should be written with simple words and supported by audio/video materials.

- **Encourage women to participate in PMP activities**

Training to farmers aims to enhance their capability of mastering the biological control skills for common pests and controlling pests and diseases in cost-effective way. The training covers how to identify the pest and diseases, how to make correct control decision and how to take appropriate preventive and control measures.

Farmers will be given training for 3-4 times during the pest control period (each time for one day and train 30-40 households at a time).

**Training covers the following area:**
- morphological characteristics and identification of pests and diseases
- damage and loss from different pests and diseases
- identification of major natural enemies to the pests
- occurrence of major pests and diseases;
• field sampling and outbreak density estimation of pests;
• pest control threshold;
• pest and disease control measures, including agricultural, physical, biological and chemical control methods;
• pesticide selection and use safety skills;
• safe storage of agricultural chemicals and disposal of their packaging waste
• field survey method
• control specifications
• integrated control measures combining agricultural, physical, biological and chemical control methods, safe storage and management of pesticide and disposal of pesticide waste and packaging container
• Chemical drug application method and protection requirements during application

Trainers are comprised by:
• Leading agricultural household and demonstration farms
• Trained agricultural technology promotion personnel
• Jiangxi General Station of Plant Protection and Inspection
• Other institutes of Jiangxi Province (e.g. Jiangxi Academy of Agricultural Science)

4.2.2 Supervision and Management
Management of PMP implementation will be strengthened through the following methods:
• training to farmers, technical and promotion people at county and township level
• develop a monitoring plan to evaluate pest and disease control and PMP implementation under the project
• Appoint a person from project office specifically responsible for checking on the pest management and PMP implementation and giving appropriate financial support to PMP management agencies.
• Set PMP as the direction of Provincial Agricultural Technology Promotion Station on pest/disease control
• Enhance the connection among province, city, county, township and village level, and solve problems in a timely manner, so that the PMP can be smoothly implemented
• Promote measures and methods of reducing the use of highly toxic pesticides and encourage private owners especially agrochemical distributor to effectively adopt PMP measures.

4.3 Monitoring Evaluation

4.3.1 Content of Monitoring
• the area under integrated pest and disease control in project area
• training of integrated pest and disease control in project area
4.3.2 Monitoring Parameters and Inspection Content

(1) Monitoring Parameters

- Total farmland area participated in the integrated pest/disease management
- The number of people participated in the training of integrated pest management
- The number of solar insecticidal lamps installed.
- The area using bio-pesticides
- Survey of chemical drug dosage and use volume of farmers adopting IPM measures
- Survey of agricultural product drug residue under IPM measures

(2) Inspection Content

- The evaluation of World Bank Inspection Group on the local monitoring plan
- Issues arise from the PMP implementation process
- Inspection result from all levels

4.3.3 Monitoring and Inspection Plan

Project Office at all levels should be responsible for ensuring the monitoring activities on regular basis. Project Office and Agricultural Technology Promotion Center at all levels shall supervise and inspect the implementation of pest management plan in pest and disease peak period and coordinate with the World Bank Supervision Group to carry out supervision work. Bank Supervision Group should be comprised by experienced pest and disease control experts. The supervision and inspection may take place for 1-2 times a year, usually in the pest and disease peak time.

- Monitoring of pest management: conducted by Project Office and Plant Protection Station at all levels. Once pest is found, take time report and treatment actions
- Inspection plan: Normally run by all levels of Project Office. At pests and diseases in peak time, inspection and control is to be done by the Plant Protection Station
- Technical expertise needed: Plant Protection Station at all levels to provide plant protection experts and PMP method.

4.3.4 Reporting on PMP Progress

- Project undertaking units are responsible to submit timely project progress reports every year, interim performance report at middle of the implementation period and overall performance report at the end of the implementation period.
- Project annual and interim reports include the years of implementation, the use of project funds, the progress of the project, project implementation effect, variance between actual result and expected results, problems and solutions during the implementation of the project.

Report to be submitted at the end of the project should include the implementation years, the use of project funds, the progress of the project, project implementation result and evaluation, the difference between the actual result and the expected result, issues and solutions met from the process. Project result is evaluated based on the adoption of standard technology, increase of farmers' income, improved living standard due to the use of new technologies, the quality and safety of agricultural products, impact on the ecological environment, the sustainability of the project, project organization and
management, etc. The overall project achievement will be analyzed through the evaluation on the result of the finished products.

5. Work Plan and Cost Allocation

In order to achieve the target of the PMP plan, activities and expected outputs, this project plans to carry out work in the following five aspects, i.e. agricultural control, physical control, biological control, training to farmers, technical support and monitoring.

5.1 Work Plan
5.1.1 Agronomic Control
To introduce and promote stress resistant new varieties in the project area, reduce pathogenic source and the outbreak frequency of pests and diseases. Under this project, new varieties of rice, rapeseed and vegetables will be introduced to grown on 4,835 hectares of land.

5.1.2 Physical Control
Solar insecticidal lamp will be promoted in the project area. 1,486 such lamps will be bought.

5.1.3 Biological Control
Biological control is an important part of the PMP integrated pest management plan. It is targeted to promote bio-pesticides and other measures to reduce the use of chemical pesticides, to reduce damage to the environment. Under the project plan, farmers are subsidized to buy bio-pesticide subsidies. 300,000 kg of biopesticide are planned to be purchased with subsidy.

5.1.4 Training to Farmers
Training to farmers is a key component of the PMP integrated pest management plan. The training aims to help farmers of the six projects Counties to establish the principles and methods of continuously adopting IPM concepts, improve farmers’ IPM knowledge and plant protection skills, enhance their awareness of environment protection and sense ownership in participating in IPM activities, so as to realize safe and cost-effective use of pesticides, reduce pesticide residues in agricultural products, achieve the sustainable agricultural production and the diversity of the ecosystem and the improvement of living standards. Training to farmers has three aspects (Table): the first one is training to trainers - to establish a trainer’s team for farmers’ training; second one is farmer’s field schools- to identify and analyze problems they encountered from their own production so as to improve farmers’ initiative and quality; the third is farmers’ mobile training team.

Participatory training: Farmer’s field school will be established in the project area. Trainers are mainly made of agricultural promotion personnel at township (town) level and experienced farmer technicians. The trainer will provide pertinent instructions and training to farmers on how to identify and control pests/disease according to pests/ diseases
situation of different growing stages and the issues raised by farmers. Thus farmers’ technical knowledge, as well as organization, communication and management skills can be enhanced.

Mobile training: The project team will organize mobile training team composed of experts from the agricultural research institutes, universities and agricultural management and promotion agencies to go to farmer’s field school or township and villages in the project area and conduct training to farmers, agricultural technology promotion, technical personnel and pesticide dealers on regular or irregular basis. They will impart the latest IPM concept, pollution-free pest/disease control technology, safety of pesticides management and related policies and regulations on pesticides sales.

Targeted trainee: agricultural technology promotion personnel at county (district) and township (town) level; plant protection specialist, farmer technician and farmers, etc.

**Table 9 Project Training Plan**

<table>
<thead>
<tr>
<th>Training Category</th>
<th>Training Content</th>
<th>Targeted Trainee</th>
<th>Training Forms</th>
<th>Training Times</th>
<th>Execution Agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training of Trainers (TOT)</td>
<td>Latest IPM concept, Pest management plan of the project, New technologies of pest and disease control Safety of pesticides application and related policies and regulations on pesticide sales</td>
<td>Agricultural promotion personnel and plant protection specialist at city, county (district), town (township) level</td>
<td>Training Lecture</td>
<td>3 times each year on regular basis, 90 ppl/month</td>
<td>Project management office</td>
</tr>
<tr>
<td>Farmer’s Field School (FFS)</td>
<td>Identifying of major pests and diseases; Prevention and control measures; Safety of using pesticides and disposal of pesticides waste and packaging material</td>
<td>Farmer technician, farmers and pesticide distributors in the town (township) of the project area</td>
<td>Participatory Training</td>
<td>4 times each year on regular basis, 160 ppl/month</td>
<td>Project management office</td>
</tr>
<tr>
<td>Farmer’s Mobile Training Team</td>
<td>Project pest/disease management plan; New technologies of pest and disease control Safety of using pesticides Characteristic of Pests and diseases occurrence</td>
<td>Agricultural promotion personnel and plant protection specialist at city, county(district), town (township) level and farmer technician</td>
<td>Mobile Training</td>
<td>189 ppl/month, on irregular basis</td>
<td>Project management office</td>
</tr>
</tbody>
</table>
5.1.5 Technical Support and Monitoring
Technical support and monitoring are involved in the entire World Bank supported project. PMP program is one part of the project. Dedicated plant protection expert will be employed to the expert group to provide technical support for the entire project. At the same time, professional monitoring agency will be hired to monitor the progress of the PMP program.

5.2 Fund Allocation
PMP Pest/disease Management Plan is an important part of the sustainable agricultural project supported by the World Bank loans. The fund is allocated based on the needs of all the activities under the PMP program and primarily considered from five aspects of the work plan above mentioned. The detailed budget is as shown in the table below (Table 10):

Table 10 Funding Summary of the Pest/disease Management Plan (2013-2017)

<table>
<thead>
<tr>
<th>Content</th>
<th>Unit of Measure</th>
<th>Quantity</th>
<th>RMB 10K</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Agricultural control (anti-stress new variety demonstration and promotion)</td>
<td>hectare</td>
<td>4835</td>
<td>775.8</td>
</tr>
<tr>
<td>2. Solar insecticidal lamp</td>
<td>set</td>
<td>1486</td>
<td>573</td>
</tr>
<tr>
<td>3. Subsidy to biological control</td>
<td>hectare</td>
<td>10062</td>
<td>503.1</td>
</tr>
<tr>
<td>4. Training to farmers</td>
<td>ppl/month</td>
<td>439</td>
<td>131.7</td>
</tr>
<tr>
<td>5. Technical support</td>
<td>ppl/month</td>
<td>22.25</td>
<td>53.4</td>
</tr>
<tr>
<td>6. Inspection and monitoring</td>
<td>project</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>2067</td>
</tr>
</tbody>
</table>

5.2.1 Agronomic Control
It plans to invest RMB 7.758 million on agricultural control mainly for promoting new rice and rapeseed varieties on 4835 hectares. The fund is mainly used in new variety introduction, demonstration and promotion.

5.2.2 Physical Control
On physical control, it plans to purchase solar insecticidal lamps 1486 sets covering an area of 2,972 hectares. Based on installing one solar insecticidal lamp per 30 Mu, RMB 3,500-4,000 per lamp, the total investment will be RMB 5.73 million.

5.2.3 Biological Control
Biological control will be adopted on 10,062 hectares of land in this project which will be achieved mainly by increasing the biopesticides application area.
To increase farmers’ enthusiasm, the project will buy biopesticide 300,000 kg based on the standard of 1.5-2 kg per hectare at the price of 20rmb/kg. Famers will be subsidized by 500 rmb per hectare for the purchase of biopesticides. 5.031 million yuan of subsidy will be released under the project.

5.2.4 Training to Farmers
There will be 3 training classes arranged for the trainers each year in each county according the crop growing stage and seasons, totally 90 times in five years, 30 people each time, 90
people per month, with total investment RMB 270,000. Farmer’s field school will be arranged 4 times a year in each project county (totally 120 times in five years in the six project counties), training 40 farmers a time and 160 people/month during the project implementation period, total investment RMB 480,000. The project will also establish farmers’ mobile training teams to carry out training to farmers on irregular basis, targeting to train 189 people per month, total investment RMB 567,000.

5.2.5 Technical Support and Monitoring
To ensure the smooth implementation of the PMP program, the project will employ technical personnel to carry out technical support and monitoring to the project area. Based on the arrangement of 0.7 person per month per county per year, 21 month for 6 counties for 5 years, provincial arrangement at 1.25 people per month, at the cost of 24,000 rmb per person per month, the total cost will be RMB 534,000. Professional monitoring agency will be hired to carry out monitoring on 6 indicators at cost of 60,000 rmb per year and total cost will be RMB 300,000.

6. Public Consultation
In the process of compiling this PMP plan, repeated solicitation has been made to the agricultural administrative departments at all levels, technical departments, farmer’s associations and farmers, provincial agricultural promotion agencies as well as the World Bank Project Office officials for their opinions and advices to make the PMP plan more suitable to the status of the project area and meet the management concept of the World Bank Project Office.

Public Consultation Records

<table>
<thead>
<tr>
<th>When</th>
<th>Where</th>
<th>Materials provided</th>
<th>Participants</th>
<th>Questions Raised</th>
<th>Actions Taken</th>
</tr>
</thead>
</table>
| March-April 2011 | 6 project counties     | Provided the brief information of the project counties based on the World Bank Project Requirements | Comprehensive Agricultural Development Offices of 6 project counties and related technical departments as well as trusted PMP plan compiling organizations | 1. Project target and range of implementation.  
2. Pest and disease control plan framework and document format. | 1. Replied after confirmed with the State Project Management Office.  
2. Compile the guideline based on the current PMP documents |
| July-August 2011 | Nanchang and all project counties | Sort out the PMP related information from the 6 project counties, draft          | Jiangxi Agricultural Science Academy, Provincial Project Office and plant protection and agricultural | 1. PMP implementation plan is not specific  
2. need to | 1. Make the implantation plan more detailed and applicable.  
2. Enhance the |
<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Revised PMP Plan</th>
<th>World Bank Project Office (expert)</th>
<th>1. Project arrangement is not closely linked to the plan.</th>
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</thead>
<tbody>
<tr>
<td>April, 2012</td>
<td>Anfu, Nanchang</td>
<td>Revised PMP plan</td>
<td>World Bank Project Office (expert), Agricultural Sciences Academy of Jiangxi, project offices at provincial and county level</td>
<td>2. Need to identify the toxicity of the pesticides (WHO).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3. Illustrate relationship among the administrative organizations with an organizational chart</td>
</tr>
<tr>
<td>July-August 2012</td>
<td>Beijing</td>
<td>Second-revised version of the PMP plan</td>
<td>World Bank Project Office (expert)</td>
<td>1. Mitigation measures, monitoring, organization arrangements, training and implementation do not match with the information in the tables</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2. The total document is too long.</td>
</tr>
</tbody>
</table>

1. Table is improved based on World Bank Suggestions.
2. Irrelevant words have been deleted.
3. Shelterbelt for the farmland and roads, PMP plan are added.
3. Need to add Farmland shelterbelts, pest and disease control content
### Appendix 1 Table of Pest and Disease Management Plan

#### A. Mitigation Measures

<table>
<thead>
<tr>
<th>Project Activities</th>
<th>Potential risk to environment and health</th>
<th>Corresponding Mitigation Measures</th>
<th>Responsible agency/person</th>
<th>Cost (10,000 rmb)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sub-total</strong></td>
<td></td>
<td></td>
<td></td>
<td>2067</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Improvement of irrigation and water conservancy conditions, growing structure adjustment supported by the project</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
|                    | 1. May increase the volume of the pesticides used due to poor management of the project | 1. Strengthen the monitoring and forecast of pesticides and diseases. | 1. Project office at provincial and city level  
2. Provincial monitoring agency  
3. Plant protection people at county, township and village level | 30 | Hire professional monitoring agency and set up monitoring sites at each project county |
|                    | 2. Farmers may not be able to properly use, store and apply pesticides. | 2. Adopt integrated pest and disease management in the project area. | 1. Project office at city/county level  
2. Agricultural technology promotion people at city/county level  
3. Farmer’s Association and farmer from the demonstration site | 1851.9 | |
|                    | 3. Farmers may use high-toxic pesticides. | (1) Introduce new anti-stress variety |                           | 775.8 | |
|                    | 4. Farmers may use excessive amounts of chemical pesticides. | (2) Promote the use of solar insecticidal lamps |                           | 573 | |
|                    | 5. Farmers may not strictly store the remaining pesticides | (3) Introduce and promote biopesticides and reduce the use of chemical drugs |                           | 503.1 | |
|                    | 6. Not enough PMP awareness | 3. Implement PMP pest and disease management training plan and provide PMP training to farmers, technical personnel, pesticides dealers and project office in city and county level | 1. Project office at city/county level  
2. Agricultural technology promotion people at province/city/county level  
3. Farmer’s Association and farmer from the demonstration site  
4. Mobile training group of experts | 131.7 | |
|                    |                                          | 4. Set up expert advisory group with agricultural (plant protection) experts to provide irregular technical support in the project area and guide farmers to take scientific controls and use pesticide properly | 1. Project office at provincial and city level | 53.4 | |
|                    |                                          | 5. Contact local quality inspection department to enhance the supervision on drug sales and application in the demonstration area and forbid the use of Category I pesticides specified by WHO (1A,1B). | 1. Project office at city and county level  
2. Technical personnel from provincial and county level Agricultural technology promotion station  
3. Farmer’s Association and farmer from the demonstration site | | |
## B. Monitoring

<table>
<thead>
<tr>
<th>Proposed Mitigation Measure</th>
<th>Parameters to be Monitored</th>
<th>Location</th>
<th>Data and/or Measurements (incl. methods &amp; equipment)</th>
<th>Frequency of Measurement</th>
<th>Responsibilities (incl. review and reporting)</th>
<th>Cost (equipment &amp; Labor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implement integrated pest and disease management in the project area with the following:</td>
<td>• Number of insecticidal lights</td>
<td>Area adopted with the corresponding measures in the 6 project counties</td>
<td>• Count the number of insecticidal lights added</td>
<td>Once/year</td>
<td>County Project offices, professional monitoring agencies or specialists</td>
<td>30</td>
</tr>
<tr>
<td>• adopt agricultural measures (introducing new variety)</td>
<td>• Area of land with biopesticides application</td>
<td></td>
<td>• Count the land area with biopesticides application</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Install insecticidal lights</td>
<td>• Added land area with PMP measures adopted</td>
<td></td>
<td>• Count the added land area with PMP measures adopted</td>
<td>After each training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Use biopesticides</td>
<td>• Changes of chemical drug application</td>
<td></td>
<td>• Investigate representative farmers involved in the IMP, calculate the reduced volume of chemical pesticides based on the volume of contrast year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training (farmers, agricultural promotion agencies and technical departments)</td>
<td>• Changes of drug residue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Times of training and number of people trained</td>
<td>• Training site</td>
<td>• Count the number of people trained</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


## C. Institutional Strengthening and Training

<table>
<thead>
<tr>
<th>Institutional Strengthening Activity</th>
<th>Position(s)(Institutions, PIUs, contractors, construction supervision consultants)</th>
<th>Scheduling</th>
<th>Responsibility(ies)</th>
<th>Cost Estimates</th>
<th>Accountable Party</th>
</tr>
</thead>
</table>
| Arrangement of Mitigation measures   | Comprehensive Agricultural Development Office at City/county level              | To be set up before the project implementation | • Select demonstration base for the project area;  
• Urge the project units to carry out pest control plan, and provide supervise on project implementation;  
• Coordinate with agricultural technology promotion units and project implementation units. |                | County Project office |
| • set up project office at city/county level |                                                                                  |            |                     |                |                  |
| • Set up PMP Expert Advisory Group   | Provincial Research Institute, Agricultural promotion personnel and plant protection experts from project counties | To be set up before the project implementation or at the project launch | • development pest and disease management plan for the project area;  
• technical support to pest/disease management  
• help provincial Project Management Office on supervision and evaluation of project implementation,  
• assist Plant Protection Station to conduct technical investigation to the project to decide whether to provide financial support;  
• provide technical assistance on PMP technical issues  
• take part in the training to project personnel;  
• help to organize study tours and learning activities; | 53.4           | Provincial Project Office |
| Arrangement on supervision and monitoring | Provincial project office and agricultural department | To be set up before the project implementation or at the project launch | • Examination to the demonstration site of the project area  
• Supervision on the PMP implementation  
• Coordinate with the city/county project offices and project implementation units. |                | Provincial Project Office |
| • Establish supervision group for the PMP implementation |                                                                                  |            |                     |                |                  |
| • Establish pest and disease (agricultural interface pollution source) monitoring group | Third party (professional agency) | To be set up before the project implementation or at the project launch | • Set up monitoring sites and determine monitoring plan in the project area  
• Monitor the pest and disease status and provide forecast report  
• Monitor the use of chemical pesticides and drug residue | 30             | Provincial Project Office |
<table>
<thead>
<tr>
<th>II Training Activity</th>
<th>Participants</th>
<th>Types of Training</th>
<th>Content (modules, etc.)</th>
<th>Scheduling</th>
<th>Cost Estimates</th>
</tr>
</thead>
</table>
| ● Training to trainers (TOT) | Agricultural promotion personnel and plant protection specialist at city, county (district), town (township) level | Training Lecture  | ● Latest IPM concept,  
● Pest management plan of the project,  
● New technologies of pest and disease control  
● Safety of pesticides application and related policies and regulations on pesticide sales | 3 times of intensive trainings on regular basis per year per county         | 27             |
| ● Farmer’s field school (FFS) | Farmer technicians, farmers in the town (township) of the project area       | Participatory training | ● Identifying of major pests and diseases;  
● Prevention and control measures;  
● Safety of using pesticides and disposal of pesticides waste and packaging material | 4 times of intensive trainings on regular basis per year per county         | 48             |
| ● Farmer’s mobile training team | Agricultural promotion personnel and plant protection specialist at city, county (district), town (township) level and farmer technician and farmers | Mobile training    | ● Project pest/disease management plan;  
● New technologies of pest and disease control  
● Safety of using pesticides  
● Characteristic of Pests and diseases occurrence | On irregular basis                                                    | 56.7            |
## D. Scheduling and Reporting

<table>
<thead>
<tr>
<th>Activities</th>
<th>First Year</th>
<th></th>
<th>Second Year</th>
<th></th>
<th>Third Year</th>
<th></th>
<th>Etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q1  Q2  Q3</td>
<td>Q4</td>
<td>Q1  Q2  Q3</td>
<td>Q4</td>
<td>Q1  Q2  Q3</td>
<td>Q4</td>
<td>Q1  Q2  Q3  Q4</td>
</tr>
<tr>
<td><strong>A Mitigation measures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>· Provide technical support and enhance pest and disease monitoring and forecast</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
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<tr>
<td>· Introduce and promote new anti-stress varieties</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
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</tr>
<tr>
<td>· Promote solar insecticidal lamps in the project area</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
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<tr>
<td>· Introduce and promote biopesticides and reduce volume of chemical pesticides</td>
<td>X  X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>· Implement the PMP training plan</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
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</tr>
<tr>
<td>· Strengthen the supervision and management of the pesticides sales and application</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
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</tr>
<tr>
<td><strong>B Monitoring and Inspection</strong></td>
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<td></td>
</tr>
<tr>
<td>· The number of insecticidal lights installed</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>· The area of land adopted biopesticide</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
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<tr>
<td>· Newly added pest and disease control area</td>
<td>X</td>
<td></td>
<td>X</td>
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<td>X</td>
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<td>X</td>
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<tr>
<td>· The reduced amount of chemical pesticides</td>
<td>X</td>
<td></td>
<td>X</td>
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<td>X</td>
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<td>X</td>
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<tr>
<td>· Changes on chemical drug residue</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
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<td>X</td>
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<tr>
<td>· The times of training and number of people trained</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
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<tr>
<td><strong>C Institutional Strengthening</strong></td>
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<tr>
<td>· Set up project office at City/county level</td>
<td>X</td>
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<tr>
<td>· Set up PMP expert advisory group</td>
<td>X</td>
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<tr>
<td>· Set up supervision team for PMP implementation</td>
<td>X</td>
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<tr>
<td>· Establish monitoring group on pest/disease control(pollution source of agricultural interface)</td>
<td>X</td>
<td></td>
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<tr>
<td><strong>D Training</strong></td>
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<td></td>
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</tr>
<tr>
<td>· Training to trainers (TOT)</td>
<td>X  X  X</td>
<td>X  X  X  X  X</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
<td></td>
</tr>
<tr>
<td>· Farmer’s field school (FFS)</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
<td></td>
</tr>
<tr>
<td>· Mobile training to farmers</td>
<td>X  X  X</td>
<td>X  X  X  X  X</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
<td>X  X  X  X</td>
<td>X  X  X  X  X</td>
<td></td>
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</tbody>
</table>