Pest Management Plans for Major Crops
in China Agricultural Technology Transfer Project Area of Anhui

POCAD of Anhui

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Pest Management Plan (PMP) of Anhui Subproject

1. The general situation of pest management in Anhui

1.1 The organizations of crop pest management in China

At the national, provincial, county, township, village level, there have established different crop pest/disease management institutions which have their own specific functions of being responsible for the pest/disease management, pesticide management or safety production of farming products at their own level.

**National level:** the ministry of agriculture is the institutions for agricultural production management. The agricultural technique extension center of MA is responsible for the crop pest/disease management. The pesticide identification and evaluation institute of MA is responsible for the registration of pesticides. The national development and reform committee is responsible for the management of pesticide production. The concerned departments have issued a series of regulations such as “The Regulation of Pesticide Management”, “The Implementation Methods for Regulation of Pesticide Management”, “The Methods for Pesticide Production Management” etc., in order to standardize the management of pest/disease control and pesticide management. At the same time, there have drawn out series of standards or regulations for farming product production, in which the pest/disease control and pesticide management have been strictly and clearly specified.

In order to solve the problem of the high residue of pesticide in farming products from sources, especially the vegetables, fruits and tea. The MA, on the basis of strengthening the registration of 5 kinds of highly toxic organic-phosphorus pesticide such as methamidophos, has stopped the reception of the application for highly toxic, extremely toxic pesticides, and canceled the registration of highly toxic pesticide for uses in some crops. The prohibited pesticides, and the highly toxic pesticides restricted in vegetables, fruit, tea, medicine herbal are as followings:

The prohibited 18 kinds of pesticides:
- BHC
- DDT
- camhechor
- dibromochloropane
- galecron
- ethylene
- dichloride
- nitrofen
- aldrin
- dieldrin
- mercury preparation
- arsenic preparation
- lead preparation
- saikuzu
- fluoroacetamide
- glifor
- tetramine
- sodium monofluoroacetate
- silatrate. 19 kinds of pesticide not allowed use in vegetables, fruit tea and Chinese’s medicine herals: methamidophos
- parathion
- methyl
- parathion
- monocrotophos
- phosphamidon
- phorate
- isofenphos
- terbufos
- phosfolan
- an-methyl
- sulfotep
- demeton
- carbofuran
- aldicarb
- ethoprophos
- phosfolan
- coumaphos
- fenofos
- isazofos
- fenamiphos. 2 kinds of pesticide, dicrof and fenvalerate, are restricted use in tea. Any pesticide product is not allowed in use beyond the permitted scope of registration.

**The provincial level:** the plant protection station of Anhui agricultural committee is responsible for the predict and forecast of pest/disease occurrences, recommendation of pesticide varieties and control methods. The Anhui pesticide identification and evaluation institute is responsible for the registration of the pesticides within the province. The petrol - chemistry industry association of Anhui Province is responsible for the management of the

The County level: The plant protection station of the county agricultural bureau is responsible for the predict and forecast of pest/disease occurrences, and recommend the controlling methods and related pesticide species, and the sales of some pesticide at the same time. The county also set up law enforcement team, responsible for management of pesticide markets. Some counties have drawn out the production standards of agricultural products for some specific crops. Due to the lack of adequate budget, the predict and forecast of pest/disease at the county level is not satisfactory.

Township or village level: there have set up agricultural technique extension stations at every township of the whole province, including some villages, which is responsible for the investigation of pest/disease occurrences within the township and village, the recommendation of controlling methods etc., also the sales of some pesticide products at the same time.

1.2 The situation of pesticide production and distribution

The production of the pesticides is carried out by the individual pesticide factory in accordance with the regulations mentioned above. There have 1000 pesticide factories all over the country. The Nanjin red sun groups, Kesheng, Shalongda, Jiangshan of Jiangsu province, Huayang of Shangdong province are of large scale of production and high product quality.

The sale of pesticide in Anhui province mainly consists of the individual private sellers, plant protection station, agricultural technique extension station and the agricultural material companies. The individual private sellers occupy larger proportion of the sales. Generally, the pesticide factories or agents wholesales the pesticide to the retailers such as the individual private sellers, plant protection station, agricultural technique extension station and the agricultural material companies, and then sold to the farmers. The pesticide with three certificated can only be sold in the markets.

1.3 The damages by major pest at the project area

Dangshan pear: The major pests of pear are borer, plant hopper, aphids, mites, scale, the plant hopper has become more serious in recent years. The disease are scab,rust, ring rot etc. The scab could be serious in some years. For instance, in 2000, the production loss caused by the scab reached to 60%. The ring rot is major reasons for the rotten of fruit. Bad control of ring rot can lead to the rotten of all pear fruit in whole carton or whole storage cellar.

Rice: the pests are stem borer, leaf roller, plant hopper thrips etc. the increasing damage of stem borer lead to reduction of rice grain by 10%-20%. Plant hopper and rice leaf roller usually occurs at large scale and seriously in particular year with output reduction by 40%. The sheath blight often occurs. The leaf blight varies in different years. The rice blast only damages the rice in southern part of Anhui province. The occurrences of strip leaf blight are increasing. The weed in paddy field are barnyard grass, difformed galingale needle
spikesedge, bog pondweed, *Monochoria vaginalis* etc. The extent of ordinary damage is about 70%, and 45% for the middle degree of damage and above.

**Wheat:** the major pests of the wheat are underground pests, aphides, mites, weat blossom midges, armyworn. The improper controlling will result in serious loss of grain yields. The disease of the wheat are rust, smut, sharp eye spot, head scab—the sharp eye spot has been serious in recent years. The rust occurrences vary in different years. The head scab is serious in some years. For instance, in 2003 the head scab occurrence led to 40% yield decreases. The major weeds in wheat field are shortawn foxtail—blackgrass, chichweed, cleavers, corn gromwell, flixweed, procumbent etc. Shortawn foxtail is very common in the field. The damage of weeds occupies 80% in total area of wheat cultivation, and led to 50% yield loss when serious.

**Sweet potato:** the pests of sweet potato are: sweetpotato weevil, *Herse convolvuli*, cotton worm, grub, mole crickets, click beetles etc. Sweetpotato weevil can seriously damage the yield and quality of sweet potato. The diseases are root rot(*Fusarium solani*), soft rot(*Rhizopus* sp) and black spot(*Ceratocystis fimbriata*). The soft rot and black spot are major diseases of the sweet potato during storage, and could cause remarkable loss at post-harvest.

**Vegetables:** The disease of peas are root rot, powdery mildew, bud wilt—*Ascochyta pisi*—rust. powdery mildew is most serious. The root rot often occurs in recent years. The pest of peas are been pod borer—soybeen fly—pea leafminer.

**Tea:** Anhui is one of the major tea production areas in China, with its favorable natural and ecological environment suitable to tea growing. The disease of tea is rare. The major pests are tea green leafhopper, tea geometrid, scale, beetle, caterpillar etc.

**Flowers:** The major pests are aphid, scale, leaf-eating lepidoptera pests etc. The disease are powdery mildew, rust, ring spots, brown spots, which are not serious.

### 1.4 The situation of pest control in project area.

**Dangshan pear:** because the Dangshan pear is susceptible to pest and disease due to only one variety, the chemical control of the pest/diseases are major form beside partial of agronomic prevention. The cost for controlling pest/disease by farmer’s household is about 2250-3000Yuan/ha with 13-15 times sprays at interval of 10-15days. The control is only 70% in average.

**Rice:** The chemical control of pests is prevailing due to no pest-resistant varieties. The same is for the disease control of rice as the hybrid rice being main cultivars and no disease-resistant variety although the disease resistance of hybrid rice is increasing recently. The management of pest/disease/weed is carried out by farmer’s households themselves of buying and spraying agrochemicals. The cost for management is about 450-900Yuan/ha due to many times and overdoses of sprayings, for instance, 5-6 times, and mixing uses of 3-4 products for whole period of rice growing. The prevention is about 60%-80%, which resulted in low efficiency and increases of pest-resistance to agro-chemicals.

**Wheat:** seed coating can prevent the underground pests of wheat. But the higher cost and inadequate amount of pesticides can nor meet the requirements of control. The ring rot at tillering and elongation stage is not appropriately controlled. The pests at heading stage can be controlled basically., neglect of controlling scab are due to the incidence of occurrences. The extension of synthesized weed killer such as tribenuron-methyl, the weed in the wheat field are under good prevention.
**Sweet potato and vegetables:** Basic control of the pests/disease, artificial removal of weeds.

**Tea:** Good control of pest/disease. Due to overdoses of dicofol and fenvalerate, its high residues negatively affect the export of the tea.

**Flowers:** Neglecting the control of pest/disease.

### 2. The recommended PMP at project area

#### 2.1 The recommended new method for prevention of pest

Taking the integrated adjustments of farming field ecology as main body, and making full use of the natural regulation of factors within the system, the management of pest/disease/weed can conduct some artificial control properly. In artificial control, it is necessary to optimize the system structure of farming field, select good resistant varieties, to modify the cultivation techniques for healthy production. On the basis of precise predict and forecast, the chemical controls can be carried out appropriately.

The specific techniques are as follows:

- Establishment of highly credible predict and forecast system with 90% accuracy.
- Selection of resistant crop varieties (pest-resistant and disease-resistant)
- Proper management of water and fertilizer, increasing application of organic manure for promoting plant healthy growing.
- Full exploitation of natural enemy, optimization of eco-environment such as growing grass in orchard, growing beans on field bank so as to nurture and enhance the capacity of the natural enemy and reduce the doses of pesticide sprayings.
- Strengthen the agronomic control of pest/disease and weed.
- Active extension of bio-agro-chemicals such as jinggangmycin, polyxin, Nongkang120 etc.

- Rational application of highly effective, low toxicity and residual pesticide, and prohibition of highly toxic and residual ones.
- Use of ozone for fresh-keeping storage of Dangshan pear, sweet potato.

#### 2.2 The approved pesticides in project area

- **Dangshan pear:** imidacloprid, avermectin, azadirachtin, endosulfan, calcium polysulfides, **Beta-cypermethrin**, Beauveria, polyoxin, junduqing, flusilazole, diniconazole, carbendazim, m, ancozeb, bordeaux mixture, amitraz, clofentezine etc.

- **Rice:** fipronil, triazophos, imidacloprid, buprofezin, jinggangmycin, tricyclazole, diniconazole, propiconazole, pyrazosulfuron-ethyl, bensulfuron methyl, butachlor, oxadiazon.

- **Wheat:** phoxim, Beta-cypermethrin, lambda-cyhalothrin, carbendazim, diniconazole, tribenuron-methyl, isoproturon, fenoxaprop-p-ethyl.

- **Sweet potato and vegetables:** B.t., phoxim, triazophos, Beta-cypermethrin, lambda-cyhalothrin, prochloraz, quizalofop-p-ethyl, fenoxaprop-p-ethyl.

- **Tea:** imidacloprid, Granulosis virus, avermectin.

- **Flowers:** imidacloprid, copper sulphate.
The pesticides above free of the prohibited or restricted products are highly effective, low toxicity and residuals, and in accordance with the specification of pesticide management issued by concerned departments. The pesticides above are also the recommended products in regulations and standards for specific crop production.

2.3 The proposed organizations of pest management at project area

2.3.1 The predict group
The prediction is the premise and basis for chemical control. Therefore, 22 predict station will be set up, 8 stations upgraded in Anhui project area for systematic monitoring (periodic and site-specific observation) of the pest/disease/weed occurrences at all sub-project areas, and enhance the training of technicians of predicting for higher accuracy.

2.3.2 Implementation group
The established expert group of pest/disease/weed management will be responsible for, and instruct pest/disease/weed all over the sub-project area. The group will comprise of the specialists from Anhui Academy of Agricultural sciences, Anhui Agricultural university and plant protection station of Anhui Agricultural committee. The corresponding county-level expert groups for draw-out and implementation of pest/disease/weed management at every sub-project area also will be set up for all sub-project area, consisting the specialists from the technique supporting unit, the county plant protection station, agricultural extension station and other invited experts.

2.4 The trainings of pest/disease management techniques

2.4.1 The content and materials for trainings
The occurrence mechanisms of pest/disease, its control methods, use of pesticides etc. Compiling the technique pamphlets of detailed pest/disease management techniques according to specific crops, and distributing leaflets on the techniques of control according to the time of pest/disease occurrences to each farmers household

2.4.2 Training plans
A systematic training will be conducted at the beginning of project. Then the control technique of pest/disease for specific crop will be carried out before growing, and simplified training at the key control time of every pest/disease so as to help farmers understand and master basically the occurrences and control methods of pest/disease.

2.4.3 The estimation of budget
See the detailed investment of pest/disease management plans in sub-projects

2.5 The evaluation and reports of implementation of the PMP

2.5.1 The goals of the project
It is to aim at the increase of yield, efficiency and ability of ecological adjustment, reduction of loss resulted from pest/disease/weed damages, doses of pesticide application, and impact to environmental pollution. The goals of the project are as follow:

The integrated control will occupy more than 90% of the project area during the implementation of IPM technique

Increase the accuracy of predict and forecast from major pest/disease from 70% to 90%;
Reduction of losses from 10% to 5% caused by pest/disease/weed;
The resilient balances of economic, social and ecological efficiency by conducting sustainable control over whole period during the prevention of pest/disease/weed.

2.5.2 The monitoring of the implementation results

The monitoring team will be set up at provincial level and sub-project level for inspecting the implementation processes of pest/disease control, finding out and correcting problems, summarizing and exchanging experiences on time. By the end of the crop growth or year, the results of pest/disease control should be summarized.

2.5.3 The reporting of project implementation

By the end of Nov. each year, all sub-project will submit the annual report to general project group. The final reports will finished by the end of Feb. of second year for evaluation of the expert group.

3. The detailed measures for extensions

3.1 Enhancement of the pest predict and forecast

The enhancement of pest/disease predict and forecast by the mutual supporting of sub-subject and local sectors agricultural technique extension and plant protection.

3.2 Strengthen the management of the pesticide

The local governments of some sub-project area such as Nanling County will draw out related policy and rules to eliminate the sales of the prohibited pesticide products. The uniform purchase and sales of pesticides at the project area will be initiated. On the basis of predict and forecast, the uniform prevention and control of pest/disease/weed also will be carried out. The construction of agricultural law enforcement personnel will be enhanced for uplifting the level of law enforcement. The periodical inspection of the law enforcement teams and the hot-line set-up for the reporting of sales of prohibited pesticide. Some awards will be distributed to the people who report the actual sales of prohibited pesticide so as to reduce the sprayings of prohibited pesticides by mutual supervision.

3.3 Training of farmers

There have lot of training of farmers at sub-project areas. The IPM technique is one substantial content of training content for every sub-project. The aim of the training is to increase the farmer’s awareness of environment, control skills of pest/disease/weed control, and to reduce the doses of pesticide spraying self-conscientiously.

3.4 The compensation for the losses of the farmers

In order to encourage the farmers to apply IPM technique, reduce pesticide doses, some sub-project such as Nanling county) will subsidize the farmers with 700,000 yuan for the losses after the elimination of highly toxic and residual pesticide at 2 years before project implementation. At the same time, the price increase of the rice via IPM techniques will also enhance the farmer’s incomes, and promote the farmers to apply IPM technique voluntarily.
3.5 Strengthen the IPM research

The IPM technique is of developing and perfecting technique. The pest/disease of crop changes with the changes of the farming land ecological community. Therefore, it is necessary to enhance the IPM research for the sake of real IPM. The more emphasis will be put on the research of natural enemy such as spider and frog etc while controlling the crop pest/diseases. In addition, it must put more attention on the research of hi-tech application in IPM. The whole mastering of the dynamics of the biology community in the farming field will help control the pest/disease specifically and reduce the losses.

4. PMP of sub-project (Dangshan pear’s)

4.1 The agricultural production at project area

4.1.1 The cultivation structure of major crop at the project area

Dangshan County is located in the far north of Anhui province. The climate belongs to semi-humid monsoon temperate zone, with clear four seasons of well-tune temperature, appropriate rainfall, sufficient solar radiation, long period of frost-free, which are suitable to the growth of fruit and many kinds of agricultural crops. There have total land of 1194 km², arable land of 60,000 ha. The Dangshan is the big county for its fruit cultivation, with output of 1.0 million t fruit in the area of 700,000/15 ha, which include 33,000 ha of pear production with yield of 75,000 t. the rest of 200,000/15 ha are growing with food grain crops such as wheat, corn sweet potato. The five townships of Liangli, Geji, Xianmiao, Quanji, Xinan with 28 villages, and Dangshan Orchard Farm are within the demonstration area. The demonstration area is the origin place of Dangshan pear cultivation, with land area of 72km² and 4000 ha of farming land including 50,000/15 ha of pear production, having same production model as the whole county.

4.1.2 The current situation of pear production

The farmer’s household contract production is the major form of pear cultivation, each household have 0.3-0.7 ha of pear. The pears trees of many farmer’s households have formed the large area of pear orchard where some other crops or vegetables are intercropped.

4.2. The analysis of main disease, pest and weed at the project area

4.2.1 The composition of main disease, pest and weed in pear production

Pest: leaf pest : pear psylla (Psylla chinensis), aphids, mites;
Fruit pests: large pear borer (Grapholitha molesta).
Diseases: leaf disease: pear scab (Venturia pirina), pear rust (gymnosporangium harrarum).
Fruit disease: pear scab (Venturia pirina), Physalospora pricola, Closterella cingulata etc.
Branch disease: Valsa canker (Valsa ambiens), Physalospora priricola etc
Physiological disorder: leaf-smalling disease, yellows, nutrient deficiency symptoms

4.2.2 The damage of major disease/pest and loss of pear production

Due to long cultivation of pear, the damage of disease and pest are grave. There will not have fruit and leaves on pear tree if not using insecticides. The farmers practices in present control of disease/pest also led to 20-40% loss of output.

4.2.3 The prevention methods and its evaluation
The major used insecticides are fenvalerate, isocarbophos, imidacloprid, avermectin etc. The fungicide are asomate, copper agents, carbenazim, thiophanate-methyl, diniconazole etc. The acaricides are dicofol, danjiami etc. The methods employed for control of disease/pest is that Agrochemicals are sprayed every 10-15 days after the flowering of the pear tree with total 12-15 time in whole production season. The inappropriate mixture application of insecticide and fungicide has led to: a. increase the cost of agro-chemicals and its applications; b. ineffective control due to improper timing, c. the polluted fruits and consequent lower price of pear fruit due to overdose application; environmental pollution, killing of natural enemy of pests, and inductive resistance to insecticide at the same time.

4.3 The design of integrated control of disease/pest at project area

4.3.1 Control principles: The principle of prevention first and then integrated control will be adopted, actively carrying out agronomic, artificial, physical and biological control of disease and pests; enhance the prediction of pest/disease occurrences so as to reduce the rate and times of agro-chemical applications; well timing of application and choose of varieties of agro-chemicals; Priority use of biological origin and environmentally friendly products with effective, low toxicity and residual. The residues will be kept under the allowable limit. The technique regulation of integrated control of pear disease/pest for green pear production will be worked out.

4.3.2 The control methods

4.3.2.1 Agronomic control

Intercropping in pear orchard to nurture the natural enemy of insects. The legume crops such as munbean, dwarf bean peanut, broad bean etc., vegetables, honey source crops such as buckwheat, brassica, Chinese herbal plants will be cultivated in order to raise the natural enemy of insects. The ratio of intercropping will be less than 50% of the orchard area.

Extension of growing grass in pear garden: creeper, clove, alfalfa, fodder grass Lumix, 2-3 cuttings/year as green manure, or mulches around the pear tree to set up the eco-model of grass growing between tree alleys and mulches around the tree so as to increase the soil organic matter, improve the fruit quality, nurturing the natural enemy of pests and reduce the density of pest as well. The model also can provide fodder to animal husbandry, and the organic manures from livestock.

Artificial control. Peeling at the winter season to control the canker and ring rot; brush lime paste on the low part of tree to control the pest for winter passing, rational pruning to eliminate the branches with disease and pest; Thinning the fruit for removal of the infected baby fruits.

Bagging the fruit to control fruit borers, scab, ring rot etc.

4.3.2.2 Physical control

Light trapping: The pests such as many species of moths, plant hoppers have tendency to black light, The use of the shift-frequency light will be economic and environmental protection.

Sugar and vinegar trapping: The solution of sugar and vinegar can trap oriental fruit moth, leaf roller moths, peach fruit borer.

4.3.2.3 Biological control

The protection and use of natural enemies of pests: Parasite enemies of pests are parasite bees and parasite flies, the common predating enemies are Orius minutus, thrips,
lacewing, ladybird, hover flies mites of prey etc. The raised artificially natural enemy of pest are trichogramma egg parasites, wasp, mites of prey etc.

**Application of bio-insecticides:** Bio-insecticides such as B.t., beauveria, avermectin, jinggangmycin, liuyangmycin, azadirachtin, rotenone, vertrine, matrine, huaguangmycin, polyoxin, nongkang-120 S-113 junduqing, streptomycin, nuclear polyedrovirus will be used.

**Using the insect external sex hormone.** The external sex hormone for oriental fruit borer, peach fruit borer will be applied.

4.3.2.4 Proper application of chemical insecticide

**Provide the list of applied insecticides:** The all agro-chemicals used at the project area will be high effective, low toxicity and residue. The insecticides are alpha-cypermethrin, imidaclorpid, avermectin, azadirachtin, endosulfan, calcium polysulfides, beauveria etc. The fungicides are carbendazim, diniconazole, mancozeb, Bordeaux mixture, polyoxin, diniconazole, junduqing, flusilazole. The acaricide are avermectin, amitraz, clofentezine, calcium polysulfides etc.

The pesticides above, free of the prohibited or restricted products, are highly effective, low toxicity and residuals, and in accordance with the specification of pesticide management issued by concerned departments. The pesticides above are also the recommended products in regulations and standards for specific crop production.

**Regulating of application rate of agro-chemicals:** The appropriate prediction of occurrences will help farmers at the production base control pest/disease timely and properly, reduce the frequency and dose of pesticides, and change the farmers practices of fixed-time sprayings of insecticides for safety.

**Proper use of insecticides:** First, the alternative use of different insecticides, 1-2 times of one variety per production season to avoid continuous use of same pesticides and resistance. Second, avoid spraying during the active growing stage of the natural enemy of the pests so as to protect them.

4.3.3 The technique regulation for the integrated control of major disease/pest of Dangshan pear
Table 1 The regulation for integrated control of major pests of Dangshan pear

<table>
<thead>
<tr>
<th>Growth stage of pear</th>
<th>Major diseases/pest</th>
<th>Control methods</th>
<th>Managements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dormant</td>
<td>Diseases: valsa canker, Physalospora pricola, pest: pear psylla, mites, coccids etc.</td>
<td>Spray 5°Bé calcium polysulfides or 45% crystal calcium polysulfides 40-60× before budding.</td>
<td>Combined with winter pruning, remove all falling leaves, dead fruits and infected branches etc. scrub away the peels and rotten spots etc. then brush with junduqing or 10°Bé calcium polysulfides. The tillage of soil around the tree where no grass planted in order to kill the pest for passing winter.</td>
</tr>
<tr>
<td>Budding and flowering</td>
<td>Disease: pear scab etc. Pests: overwintered pear psylla, pear yellow phylloxerid, mites</td>
<td>5% junduqing 200× plus 5% alpha-cypermethrin 3000× Injection of 1% FeSO₄ solution into trunk when deficient in Fe.</td>
<td>Before flowering, treat various overwintering sites of diseases/pests, clean and remove disease/pest residues.</td>
</tr>
<tr>
<td>Flowering to new branch growing (April)</td>
<td>Disease: pear scab etc. Pests: pear psylla, stem girdler, pear aphid, chafer etc.</td>
<td>10% imidacloprid 3000× plus 50% carbendazim 800× 80% mancozeb 800×. Spray time is fifteenth, April fore-and-aft. (Exact spray time is based upon the prediction of pest occurrences.)</td>
<td>Artificial cutting of stem girdler infected shoots, use of frequency-shift lamp to kill chafer and pear psylla imagoes. Spraying of pesticide should be at the time of 70% flower falling instead of peak flowering.</td>
</tr>
<tr>
<td>End of new branch growing (May)</td>
<td>Diseases: pear scab, Physalospora pricola. Pests: pear psylla, pear yellow phylloxerid, mites.</td>
<td>12.5% diniconazole 2500× plus 1.8% avermectin 5000× (for pear psylla nymphae) or 5% alpha-cypermethrin 3000× (for pear psylla imago), huangyeling 200× for yellows.</td>
<td>Spray insecticide 1-3 times if needed. All pests and diseases pathogen will be eliminated before fruit bagging.</td>
</tr>
<tr>
<td>Differentiation of bub and expansion of fruit (June-July)</td>
<td>Ditto</td>
<td>Insecticide: 20% amitraz 1500×, 1.8% avermectin 5000×, 35% endosulfan 1500×. Fungicide: 50% carbendazim, 70% thiophanate-methyl 1000×, 1.2.260 bordeaux mixture. Spray of insecticide should add some adhesive agent according to raining season.</td>
<td>Hanging sex hormone to trap borer imagoes during eclosion stage. Check one time every 10 days. if the pests and diseases are serious, the bag opened for control, or removal of infected fruits, leaves, deep bury disposal or burned outside the garden.</td>
</tr>
<tr>
<td>Fruit expansion and maturing (Aug.)</td>
<td>Diseases: pear scab, Physalospora pricola. Pests: pear psylla, pear yellow phylloxerid.</td>
<td>10% imidacloprid 2500×, 30% mancozeb 800×. junduqing 400×, 40% flusilazole 8000×.</td>
<td>Pest/disease is not grave at the high T time, control the spray of insecticide accordingly so as to polluted the fruits.</td>
</tr>
<tr>
<td>Harvest (Sept.)</td>
<td>Diseases: pear scab, Physalospora pricola. Pests: oriental fruit moth, leaf-eating pests.</td>
<td>10% polyoxin 1000×.</td>
<td>No insecticides; only fungicide for fruit rot, pear scab if needed to ensure green or non-polluted produces.</td>
</tr>
<tr>
<td>Post-harvest</td>
<td>All pest/disease of the tree entry into overwintering state. But storage diseases entry into active stage.</td>
<td>Generally no spray of agro-chemicals for the tree. Ozone will be used to control the storage diseases.</td>
<td>Winter pruning, remove infected branches; scrub away the valsa canker, Physalospora pricola. Brush trunk with lime to deteriorate the overwintering environment of pest/disease.</td>
</tr>
</tbody>
</table>
4.4 The content of project construction and implementation

4.4.1 The organization of project implementation

Establishing the expert group of pest/disease control which will be responsible for the draw-out and implementation of measures for controlling pest/disease/weed, and instruction, training of the farmers at the project area how to control pest/disease/weed as well. The group consists of 7 specialists from plant protection institute of Anhui Academy of Agricultural Sciences, Anhui Agricultural University, Dangshan County Plant Protection Station, and Agricultural Technique Extension Station. Prof. Zhu Jianxiang and Prof. Wang Wenxiang will be the leader and deputy leader of the group respectively. The group takes charge of design and carry-out of overall control of pest/disease.

6 township implementation teams will be set up for Liangli, Geji, Xianmiao, Quanji, Xinanmen and Dangshan county orchard farm. 3 team members with one leader, responsible for the control design implementation.

The 28 control teams will be set up at the level of village, consisting of 3-5 people, who are responsible for the implementation of pest/disease controls such as the distribution of pest/disease occurrence predication, agro-chemicals and spray machinery, and the inspecting of the control effectiveness.

The teams at the township and village will be supported with certain amount of spray apparatus and communication facilities. Estimated investment is 500,000 Yuan.

4.4.2 The establishment of the predication system for pest/disease occurrences at project area

The project will set up one new central pest/disease predication station based on the County Plant Protection Station, and be supported with 2-3 office rooms, necessary facilities for data transfer and analysis system, information distribution system and communication system.

5 predict branches will be set up at the project area. Each branch will be supported with microscope, sport trapping system, basic equipments for monitoring system of environment and meteorology, insect trapping system.

One person will be assigned as the predictor in every village, who is responsible for the investigation and evaluation of pest/disease occurrences, and supported with simple apparatus for prediction.

Estimated investment for construction of predict station: 500,000 Yuan (listed at the project detailed investments)

4.4.3 The training of technicians at the level of county and commune, and the farmers at project area

The training courses will focus on the pest/disease occurrences, control methods, insecticide application techniques, predication methodology etc for 300 technicians, the former 3 training topics for farmers at the project area. At the beginning of project implementation, 15 days of training will be carried out. The short training will be conducted before each individual pest/disease control activity. Total of 20,000 farmers will receive related trainings.
The estimated investment for training: 200,000 Yuan (listed at the project detailed investments)

4.4.4 The demonstration and extension of new techniques

Extension technique: Intercropping of other crops; grass growing and mulching; fruit bagging; proper application of agro-chemicals. Accumulative extension: 50,000/15 ha.

Estimated investment: 500,000 Yuan (listed at the project detailed investments)

4.5 The monitoring and evaluation

Upon implementation of project, the following goals will be reached at the demonstration area:

- The 30% reduction of agro-chemicals application rate over the beginning of project or non-project area. 10% reduction for each production season.
- The residues of agro-chemicals will meet the requirements of non-polluted fruits. The green fruit proportion will increase from 5% up to 30% with obvious improvement of fruit quality.
- The damage extent of pest/disease at the project area will be below 10%, including less than 5% for 50% project area. 30%-50% decreases of damages over the non-project area.
- 100% extension of highly-effective, low toxicity and residual of agro-chemicals over the project area.
- 30% cost reduction of pest/disease control.
- The biodiversities will be enhanced. The community of pests natural enemy increases markedly. The frequency and damage decreases.
- 100% of new technique extension, 90% of the access and application of new technique for pear-growers. The enhanced awareness of environmental protection.