E2221 v2

Shangdong Ecological Afforestation Project （SEAP）

Integrated Pest Management Plan

Shandong Academy of Environmental Science

July,2009

Contents

This plan is formulated according to the Regulations of Forest Pest and Disease Management promulgated by the State Council on December 18th, 1989, and requirements of the integrated pest management policy of World Bank (OP 4.09). The pests in the plan refer to all insects, mites, nematodes and diseases harmful to forest plants. The target of the plan is to strengthen the monitoring, predicting and control work of the forest pest/disease in the Shangdong Province Ecological Afforestation Project (SEAP hereinafter).

1. The Forest Pest Management in Shangdong Province

1.1 History

1.1.1 Manual Control Stage

Before 1950, there was almost no chemical pesticide industry in China because the lag economy. Some extracts from several special plant species such as tobacco, Chinese azalea flower, *Melia azedarach, Croton tiglium*, *Derris trifoliata* Lour etc and some mineral solutions such as arsenic, lime, sulfur, plant ash etc, were used individually by some farmers to kill the pests. Or directly manual eradication by catch the pest adult, larvae, pupae, eggs and cocoons, or cut the infested tree or branches. The limited control area, originally methods and incoordination, the pest could not be controlled effectively rather than emerging and perishing of themselves. In the early 1950s, organized by the government, according the terrain and distribution of the forests, large area pest control were conducted and made certain effect. The organic chloride pesticides such as DDT and BHC were first widely used in Shandong province to control forest pests. And the pest control policy formulated in 1952 by national ministry of forestry is “early control, minimized infestation, and eradication”, the tactic is “in time control, pervasive control, successive control, and exhaustive control”, which attempt to eradicate the pests entirely by human wave attack.

1.1.2 Chemical pesticide control stage

In late 1950s, chemical pesticides were popularized applied in forest pest control. After 1960, besides organic chloride pesticides, organic phosphors are widely used, and the crop dusting are applied for large area pest control. Dreaming of the omnipotence of the pesticides, the dependence on pesticides was excessive. As the pesticides dosage and control area were increased gradually, and the environment deteriorated continually, and the pesticides resistance were developed remarkably. At the mid of 1960s, as the concept ” the simply pesticide depending policy could not control the forest pests effectively” was realized and accepted, the exploration for using natural enemies such as woodpecker,

grey magpie, trichogramma etc, and exploitation of microorganism preparations and pest pheromones were started and obtained good effects. As developed and popularized of the inhaled pesticides and its application techniques, the partial pest control were adopted. Although the policy for forest pest control was still not changed, the pest control tactics was evolved as "prevention priority, active eradication"

1.1.3. Integrated pest management stage

After 1980s, people realized the abuse of the pesticides, not only could not control the pest effectively, but also cause the serious damage for the environment and mankind. In "Forestry Pest Control Regulations" promulgated by State Council in 1989, the forest pest control policy prescribe definitely as "prevention priority, and integrated pest management", multiple techniques integrated methods are advocated. The integrated pest management practice was conducted in Shangdong Province, "The expert IPM system for high-yield poplar plantations", cooperative research project by Shangdong forest overseas investment project management office and Shangdong Academy of Forestry, found out the correlations between the pests and their poplar host, between the pests and their natural enemies. .The self adaption and regulation capability of the system are considered sufficiently in making pest control decision, and supplement with other necessary control methods in time.

In December 2004, the national forest pest control policy is defined in the annual forest pest control workshop meeting as "proactive, scientific and legal efforts on prevention and control for healthy forest". It contains four parts: 1. Give priority to prevention, and improve the defence capability to pest; 2. Keep scientific guidance to control and conducted project for optimal effectiveness; 3. Enact full legal system to guarantee the pest control, and improve new solutions adapt to the forest property reform; 4. Bring the pest control into the whole process for the management of the healthy forest.

1.2 Plant protection policy in China

The Chinese government has emphasized pest control in forestry and the policy of "proactive, scientific and legal efforts on prevention and control for healthy forest" has been made. Gradual progresses have been made with the tendency of biological control as the main method for pest management.

China Green Food Development Centre has issued "the Pesticide Use Guidance" for organic food products, to guide the production of Green Food (A) and Organic Food (AA)

The objective of government policy is to control pests at low population level, promote the quality of forest and increase sustainable use of forest resources. The aim is to protect forest resources and conserve the ecological condition.

Since 1975, the concept of Integrated Pest Management (IPM) was adopted by government of China. IPM is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices. IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment.

Economic Injury Level: The lowest population density of a pest that will cause economic damage; or the amount of pest injury which will justify the cost of control."

"Whoever manages the forest should do the prevention and control" is the policy in China. The owners of the forest are expected to take responsibility for pest management if the forest is economic tree crops or commercial forest, unless the pests are plague, such as locusts. The pest control costs for national or provincial public welfare forests or shelterbelts will be covered from the public welfare forest subisidy.

Chinese government has attached great importance to food safety. It shows the following in Regulation of Pesticide Management (issued by State Council), and Standards of Pesticide Safe Use (issued Ministry of Agriculture of China): types of pesticides that can be applied for preventing or controlling pests

- pesticides that are of high efficiency, low hazard, low residues are recommended for application when non-chemical methods are not effective;
- agricultural products that exceed the pesticide residue standards should not enter the market;
- safe application methods for pesticides: preparation forms, safety and reasonable usage method, common and maximum dosage, application periods and times restriction in a year, least time after last application for product harvest

The Regulations of Pesticide Management encourages use of pesticides which are highly effective, low toxicity with low residue (HLL) with prescribed standards for the sale of

pesticides. Some pesticides, like Parathion, Phorate and Monocrotophos are forbidden for use under by Standards of Pesticide Safe Use, and Regulations of Pesticide Management.

Institute for the Control of Agrochemicals, Ministry of Agriculture and provincial institutes, are authority responsible for farm products pesticide residue monitoring (especially for vegetables, fruits and crops)

Fast growing green food markets, has urged the growers minimized or abstain the use of pesticides.

1.3 Legislation and regulation

To strengthen pest control and quarantine, the government has promulgated the Forest Law （Standing Committee of National People‟s Congress, Jan. 1,1985）, Forestry Pest Control Regulations (State Council, Dec. 18, 1989), and Technological Rules for Forest Quarantine (State Administrative Bureau of Forestry, Jul. 27, 1998), Management Measures for Target Forest Pest Control, and Regulations of Pesticide Management (State Council, May 8, 1997).

Integrated Pest Management (IPM) has been promoted by the implementation of the Pesticide Safe Use Standards, and Regulations of Pesticide Management.

Pesticides production, sale and application: First, before production, any pesticide must register according to the Regulations of Pesticide Management, and under control of safety and quality, to guarantee the environment pollution free. Secondly, pesticides distributor must obtain the sale license and only sell registered pesticides. High toxicity pesticides could not applied in food products. The products with pesticide residue above standards are forbidden into markets, especially for vegetables, fruits and crops.

When the pests occur seriously and there are no other effective methods to control, the high effective and low toxicity pesticides or biotic pesticides could be applied. Chemical control is the necessarily method for the farmers when the pests are outbreak seriously.

There are four level systems responsible for the supervision and operation of pesticides regulations: nation, province, county and local level.

- Forest management department related forest pests in four levels;
- crops and vegetables management belong to all levels agricultural departments

- Institute for the Control of Agrochemicals, Ministry of Agriculture and provincial institutes, are authority responsible for farm products pesticide residue monitoring(especially for vegetables, fruits and crops)

1.4 Organizations for forest pest management in Shangdong province

There is good framework system in Shangdong province to ensure the forest pest management. Shandong Province Wildlife Conservation Station is responsible for management, guidance and monitoring the forest pest control in Shangdong Province.

There are 161 forest pest control and quarantine stations in all prefecture cities and counties (or districts) for the guidance of local forest pest control. There are 970 technicians from all 1120 staff members. For the forest pest monitoring and forecasting, there are 43 sites designated as national sites, 25 as provincial sites, 82 as prefecture sites and 1004 as county sites in the whole province, and there are 737 full time and 3183 part time technicians for the monitoring and forecasting work.

1.5 Research and training system

The Research Institute of Forest Protection, Shangdong Academy of Forestry is the speciality research organization, responsible for the research work on spread ways, damage figure, biology characteristics and control methods of main forest pests in Shangdong province. There are 17 provincial forest protection departments in prefecture forest institutes for local pest control research. And the forest pest management staffs in county and national forest farms will be also involved in developing control techniques for special pests.

There are enough students graduated from the Plant Protection Departments in Shangdong Agriculture University and Qingdao Agriculture University eligible for forest pest management work every year. And the staffs in all levels also accept different technical training on forest pests each year for about 100,000 person-times

1.6 Practice and experience for forest pest management in Shangdong province

1.6.1 IPM as the priority

IPM according to biological characteristics of the pests, forest tending, quarantine, physical, mechanical and biological methods will be the first choice for pest control. Only when other methods of prevention and treatment does not work, and monitoring results indicate that forest pests damage will be over the economic threshold, can high effective low toxicity pesticides be applied.

There are some successful biological control experiences in IPM. Trichiogramma mass rearing and releasing to search and control pests. Pest nematodes applied in control several apple fruit moths and wood borers. And there are also some biopesticides, such as: Avermectin and Flufenoxuron. Toxicity free High-fat membrane emulsion is used to prevent the infestation of pathogens. Not all the pests could be controlled by biological methods. When the pests seriously break out, and other methods of prevention and treatment do not work, high effective low toxicity pesticides could be applied necessarily. The pesticides application depends on the occurrence area, host status and various pest species. Some pests could be controlled without pesticides, such as apricot pox and *Eutytomasam somsowi* Wassiliew. The effective way is clear away infested branches and fruits. Some pests like apple aphids, if the young apple seedlings are infested, the only control methods is spray pesticides. Usually, the pesticides are applied for fruit pests in apple, peach, pear and grape orchards. Anyhow, according the forest environment, host and pest occurrence conditions, to minimize the pesticide application times for the shelter forests is the optimum solution.

Suggestions for the project forest pest management:

- Put into effect for the Forestry Pest Control Regulations, world bank forest pest management policy, forest pest management plan for SEAP;
- Make full use of the effective pest control methods in IPM, not barely rely on pesticides；
- Select high pest resistance tree species and forbidden infested seedlings for plantations, afforest mixed forests instead of pure forests, and sanitized forestland to reduce pest occurrence.
- Strengthen the management of pesticides purchasing and application.
- Strengthen training for pesticides management.

1.6.2 Present operation in SEAP counties

What kind of control method will be applied is according to the species of the pests and injury level. At present, chemical control is still the main method. At meantime, the quarantine method, physical and mechanical method, forest management method and biological control method will also be applied. The priority of the methods depend on pest species, no pesticides needed to control apricot pox and *Eutytomasam somsowi*

Wassiliew the effective way is clear away infested branches and fruits. While the peach aphids control now should be the chemical control.

The local farmers acquire the IPM and new pesticide knowledge from agricultural TV programmers (for example" the Trend in Countryside" by Shangdong TV Station) or related pesticides technical guidance books and booklets. Local governments also provide some special training classes and advisory by technicians in counties or towns. Some forest protection techniques handbooks provide IPM methods, but could not contain all forest species in SEAP at standard level understandable to local farmers.

When using pesticides, some farmers wear shield coats, helmets, masks, and gloves. Most of the farmers purchased the manual pesticide sprayers. A few farmers purchased auto pesticides sprayers. The sprayers often be borrowed each other. Some farmers wear special work clothes, and some only with old clothes when spraying pesticides.

The maximum benefit is the main factor when farmers make control decision. Usually the chemical control is preferred for the rapid response and remarkable killing results. If they could got better income for non chemical control methods, the farmers could also give up pesticides using. There are pesticides stores distributed in almost all towns in Shangdong province, and it is very easily to purchase pesticides. Farmers usually purchase the pesticides according to need whenever necessary, and often store the left pesticides in their storage rooms. The important work is to let the farmers fully understand the options and their Advantages and disadvantages.

Pest control organizations should improve the training work, strengthen the management, guidance and supervision, it is necessary for IPM methods popularized. The training about pesticide safety usage is also needed.

The hospital in towns could deal with the pesticide poisoning incidents. The serious sufferers could be sent to county hospital. The doctors of the two level hospitals have been trained in chemical poisoning treatments.

2. Forest pest management in SEAP

2.1 Main methods

2.1.1 Plant quarantine

Plant quarantine is the method to prevent the forest or crops damage from pests or protect the crop production area from weed intruding and spread. It started in 1930s in China.

"The import and export plant quarantine laws" was brought into effect in 1991. More than 300 quarantine organizations have been set up at customs, ports, and airports to prevent the invasive pests. Many introduce pests have been found, including *Ceratitis capitata* (Wiedemann) and *Hyphantria cunea* (Drury) etc. It divided into two parts according the function: agriculture plant quarantine (managed by general plant protection station) and forest plant quarantine (managed by State-owned Forest Seed and Seedling General Station).

There are 161 forest plant quarantine stations (sites), 51 wood quarantine stations (sites), 669 full time quarantine staffs and 970 part time quarantine staffs. Provincial forest plant quarantine station is responsible for the quarantine between provinces, and county forest plant quarantine stations are responsible for the quarantine between counties.

2.1.2 Forest management control method

Main methods: (1) mixed forest afforestation or isolated zone (2) forest tending (3) set up trap trees (4) select pest resistant tree species (5) cultivate resistant species with bioengineer techniques

Mixed forests afforestation could change the biocommunity structure, which is good for natural enemy survival and propagation, and improve the control effects. Reasonable pruning, suitable fertilizer and water, scarification and weeding could increase forest self defence capability to pests. Varieties tree species have different resistance to the various pests, it is the most effective method against forest pests cultivating resistant tree species with modern biotechniques or common ways.

2.1.3 Physical and mechanical control method

It is the common ways to control forest pests. There are 3 reasons:

(1) inexpensive: no purchase for pesticide and cheap labors; (2)effectiveness: the method have extraordinary effect to certain pests, for example, trunk with sticky plastic belts could prevent looper worms and adults of scales *Drosicha corpulentato* climbing up the trees (3)safety: environment pollution free, and natural enemies protected.

Physical and mechanical method could reduce the pest population greatly without pesticide resistance increasing. The limitation is that it takes time and special tools required sometimes. And it is the complementary method.

2.1.4 Biological control method

Biological control methods are safety to people and livestocks, and environment friendly. It could Control the pest population at low level for many years. There are plenty of bioagents in nature. But the slow response and high cost to chemical control make it is unaccepted by plant growers.

2.1.5 Chemical control method

There are remarkable advantages for chemical control: (1) above 1000 pesticides varieties as the choices; (2) could purchase at any time, no season limited; (3) rapid and effective, the most remarkable advantages.

The environment pollution brought by chemical pesticides are serious, threaten the health of people and livestocks. Many natural enemies are also killed with the target pests. And many pests developed pesticide resistance.

2.2 Suggestions for Pest control in SEAP

The policy of "proactive, scientific and legal efforts on prevention and control for healthy forest" should be carried out seriously in SEAP area. Multiple combination methods should be applied together in forest pest control. Biological control methods will be the priority choice, especially biopesticides. Improving the shelter plantation quality in SEAP area, minimized the environment pollution.

Several steps are concluded:

- implement the IPM solutions to tree species in shelter plantations in SEAP.
- Edit IPM and pesticide safety usage training materials and making plan;
- Start IPM and pesticide safety usage training programme to project technicians and farmers involved in SEAP in counties and towns;
- Effective pest monitoring on shelter plantations in SEAP
- Select and purchase project approved pesticides, allot the farmers in SEAP.

This plan is the general IPM principles and methods aimed at the shelter plantations and tree species in SEAP brought forward by provincial project manage office(PMO). It will be altered and supplemented by each prefectural PMO in SEAP for the actual situation.

The training about pest control methods for each afforestation tree species in SEAP will cover project technicians and farmers involved in SEAP in counties and towns, see details in Table 3.5.1.

Training will emphasis on importance and potential advantages on nonchemical control methods, and in what kind of conditions chemical methods could be the supplement.

Forest pest monitoring and forecast is the obligation of the wildlife conservation stations at all levels. It plays an important role in effective IPM. The same policy as the world bank, forest management, biological control methods and nonchemical control methods are advocated. Only when other methods of prevention and treatment does not work, and monitoring results indicate that forest pests damage will be over the economic threshold, can high effective low toxicity pesticides be applied.

2.3 The main pests and applied pesticides in shelter forests in SEAP

It is proved that when the tree lost not more than 20% of its leaves, the growth rate is almost not affected. Thus, the pest does not need to control when its population is at low level, what is called "the biological balance". When the balance is just broken out by a certain pest, IPM is the best choice for control. And when the certain pest population grows too fast, the pesticide application is the most effective method to suppress occurrence.

When using chemical control methods, people often concerns the pesticide varieties, application methods, suitable dosages and time, and residual periods. For the guidance of pesticides safety usage, and requirement of world bank project on environment safety, we make the main pests and pesticides list for tree species in SEAP (see table 1). It could be the reference in afforestation plantation management in SEAP.

Table 1. The main pests and applied pesticides in shelter forests in SEAP

Tree species	Pest species	Applied pesticides
Pinus thunberii Parl.	*Dendrolimus spectabilis* (Butler), *Matsucoccus matsumurae* (Kuwana), *Dioryctria rubella* Hampson, *Bursaphelenchus xylophilus* (Steiner et Buhrer) Nickle, C*enangium ferruginosum* Fr.	1.8%Abamectin EC, Chlorbenzuron, Fenoxycarb, Diflubenzuron, Teflubenzuron, Abamectin·Diflubenzuron, Bt, Aloperine, Thiophanate methyl,

		Chlorothalonil
*Quercus Linn.*spp.	*Phalera assimlis* Brener et Grey, *Phalerodonta albibasis*(Chiang), *Lymantria dispar* Linnaeus, *Fentonia ocypete* Brener, *Hyperythra oblique* Warren, *Pestalotiopsis* sp., *Micros phaera alni*(Wallr.)Salm	1.8%Abamectin EC, Phoxim, Beauveria bassiana, Thiophanate methyl, Mancozeb, Wuyiencin, Agricultural Antibiotic120
*Platycladusorientalis*Franco.	*Dendrolinus suffscus* Lajonquiere, *Parocneria furva* (Leech), *Cinara tujafilina* (del Guercio), O*ligony chus perditus* Prichard et Baker, *Semanotus bifasciatus* (Motschulsky), *Xyleborus rubicollis* Eichhoff	1.8%Abamectin EC, Chlorbenzuron$^{\varsigma}$, Malathion, Acetamiprid, Beauveria bassiana, Bt, Liuyangmycin, Cypermethrin
Cotinus coggygria Sap.var.cinerea Engl.	*Locastra muscosalis* Walker, *Calophya rhois* (Low), aphids, *Ophrida xanthospilota*(Baly), *Uncinula verniciferae* Phenn	1.8%Abamectin EC, Acetamiprid, Imidacloprid, Santonin, Agricultural Antibiotic120, Thiophanate methyl, Lime sulfur
Sorbus pohuashanensis(Hance)Heal.	*Sinomphisa plagialis*(Wileman), *Psilogramma menephron*(Cramer), *Meloidogyne arenarie* (Neal)chitwood	1.8%Abamectin EC, Chlorbenzuron, Imidacloprid, Paecilomyces lilacinus, Dazomet, DCIP
Populus.tomentosa carr.	*Paranthrene tabaniformis* Rott, *Clostera annachoreta* (Erschoff), *Apocheima cinerarius* Erschoff, *Apriona germari* (Hope), *Saperda populnea* Linnaeus, *Eriophyes dispar* Nat., *Chaito phorus* populeti.	Beauveria bassiana$^{\varsigma}$, Imidacloprid, Chlorbenzuron$^{\varsigma}$, Cypermethrin, Bt var$^{\varsigma}$, Clofetezine, Entomopathogenic nematodes$^{\varsigma}$
Sect Aigeiros Dwby	*Anoplophora* glabripennis (Motsch.), Apriona germari (Hope), *Saperda populnea* Linnaeus, *Paranthrene tabaniformis* Rott, *Clostera annachoreta* (Erschoff), *Micromelalopha troglodyta* (Graeser)., *Apocheima cinerarius* Erschoff, Bark rot diseases *Dothiorella gregaria* Sacc.	Cypermethrin, Chlorbenzuron$^{\varsigma}$, midacloprid, Methamidophos EC, Beauveria bassiana$^{\varsigma}$, Bt var$^{\varsigma}$, Entomopathogenic nematodes$^{\varsigma}$, Carbendazim, Thiophanate methyl, Streptomyces hygrospinosus, Bordeaux mixture
Toona. Sinensis	*Cnidocampa flavescens* Walker, *Latoia hilarata* Walker	1.8%Abamectin EC, Chlorbenzuron$^{\varsigma}$,

(A.Juss.)Roem.	*Thosea sinensin* Walker, *Hypsipyla* sp., *Phyllactinia toonae* Yuet Lai, *Nyssopora cedrelae* (Hori)Franz.	Chlorfluazuron$^{\varsigma}$, Chlorothalonil, Agricultural Antibiotic120, Triadimefon
Fraxinus velutina Torr.	*Batocera horsfieldi*（Hope） *Hyphantria cunea* (Drury), *Hlococerus insularis* Staudinge, *Zeuzera coffeae* Nietner, *Parthenolecanium orientalis* Borchsenius, *Eeicerus pe-la* Chavannes, *Cnidocampa flavescens* Walker, *Latoia hilarata* Walker, *Temnaspis nankinea* (Pic)	1.8%Abamectin EC, Cypermethrin, Chlorbenzuron$^{\varsigma}$, Resin wash, Phoxim, Acetamiprid, Steinernema feltiae, Bt$^{\varsigma}$., Beauveria bassiana$^{\varsigma}$, Metarhizium anisopliae$^{\varsigma}$
Ulmus pumila Linn.	*Pyrrhalta aenescens* (Fairmaire), *Anoplophora glabripennis* (Motsch.), *Apriona germari* (Hope), *Vanessa indica* Linnaeus, *Callambulyx tatarinovii* (Bremer et Grey)	1.8%Abamectin EC, Cypermethrin, Chlorbenzuron$^{\varsigma}$, Phoxim, Acetamiprid, Steinernema feltiae$^{\varsigma}$, Bt., Beauveria bassiana$^{\varsigma}$, Metarhizium anisopliae$^{\varsigma}$
Robinia pseudoacacia Linn.	*Euproctis fiava* (Bremer), *Biston robustum* Butler, *Acanthopsyche nigraplaga* Wileman, *Clanis bilineata tsingtauica* Mell, *Aphis robiniae* Macchiati., *Eulecanium kuwanai* (Kanda), *Fusarium oxysporum* Schlecht.)	1.8%Abamectin EC, Chlorbenzuron$^{\varsigma}$, Phoxim, Acetamiprid, Methamidophos, Phoxim, Beauveria bassiana, Thiophanate methyl, Carbendazim, Mancozeb, Bordeaux mixture, Lime sulfur, Chlorothalonil
Salix matsudana. koidz.	*Anoplophora glabripennis* (Motsch.), *Trirachys oriertalis* Hope, *Smaragdina aurita hammarstraemi* Jacobson, *Stilpnotia candida* Staudinger, *Orgyia antique* (Linnaeus), *Gypsonoma minutana* Hubner, *Cnidocampa flavescens* Walker, *Latoia hilarata* Walker, *Aphis farinose* Gmelin, *Ailus nipponigena* Obenberger, *Valsa sordida* Nits.	1.8%Abamectin EC, Cypermethrin, Chlorbenzuron$^{\varsigma}$, Phoxim, Acetamiprid, Steinernema feltiae, Bt., Beauveria bassiana$^{\varsigma}$, Metarhizium anisopliae$^{\varsigma}$, Thiophanate methyl, Chlorothalonil, Pine tar, Dioctyl divinyltriamino glycine
Melia	*Parlatoria pergandii* Comstock,	1.8%Abamectin EC,

azedarach .Linn.	*Lyctus linearis* Goeze, *Enarmonia koenigana* Fabricius, *Anoplophora chinensis* (Forster), *Psilogramma menephron*(Cramer), *Cercospora meliae* Ell. et Ev., MLO	Neem oil EC, Cypermethrin, Phoxim, Thiophanate methyl, Polyoxin, Chlorothalonil, Tetracycline
Sophora japonica Linn.	*Apriona swainsoni* (Hope), *Semiothisa cinerearia* Bremer et Grey, *Sinoxylon japonicum* Lesne, *Pterostoma sinicum* Moore, *Cydia trasias* (Meyrick), *Meloe corvinus* Marseul, *Hlococerus insularis* Staudinge, *Dothiorella ribis* Gross. Et Dugg., *Microsphaera robiniae* Tai	1.8%Abamectin EC, Phoxim, Prothiophos, Acetamiprid, Steinernema feltiae, Bt., Beauveria bassiana, Metarhizium anisopliae, Thiophanate methyl, Chlorothalonil, Mancozeb, Triadimefon
Juglans regia Linn.	*Lymantria juglandis* Chao, *Culcula panterinaria* Bremer et Grey, *Atriuglans hetaohei* Yang, *Batocerahorsfieldi*（Hope）, *Drosicha corpulenta* (Kuwana), *Actias selene ningpoana* Felder, *Uropyia meticulodina* (Oberthur), *Xanthomonas campestris* pv. Juglandis(Pierce)Dye, *Melanconium oblongum* Berk., *Cytospora juglandicola* Ell. et Barth., *Colletotrichum gloeosporioides* Penz.	Prothiophos, Chlorbenzuron$^{\varsigma}$, Cypermethrin, Sumicidin, Beauveria bassiana, Thiophanate methyl, Zineb, Lime sulfur , Bordeaux mixture, Terramycin, Pine tar, Dioctyl divinyltriamino glycine, Thiram, MAFA
Castanca mollissima Carr.	*Dryocosmus kuriphilus* Yasumatsu, *Lachnus tropicalis* (van der Goot), *Conogethes punctiferalis* (Guenee), *Eotetranychus tiliarium* (Hermann), *Synanthedon castanovora* Yang et Wang, *Stromatium longicorne* (Newman), *Macrocorynus psittacinus* Redtenbacher, *Latoia sinica* Moore, *Coryneum kunzei* Carda var. *castaneae* Sacc. Et Roum, *Cytospora* sp.	Imidacloprid, Chlorbenzuron$^{\varsigma}$, Cypermethrin, Dipterex, Sumicidin, Thiophanate methyl, Chlorothalonil, Pine tar, 843 Recovery solution, Dioctyl divinyltriamino glycine

Prunus armeniaca Linn.	*Eurytoma maslovskii* Nikolskaya, *Grapholitha molesta* Busck, *Aromia bungii* (Faldermann), *Hyaloptera amygdale* Blanchard, *Didesmococcus koreanus* Borchsenius, *Rhynchites faldermanni* Schoenherr, *Pseudaulacaspis pentagona* Targioni-Tozzetti, Apricot pox, *Colletotrichum gloeosporioides* Penz., *Monilinia laxa* (Aderh. Et Ruhl.)	Phoxim, Sumicidin, Malathion, sex pheromone, Entomopathogenic nematodes, Lime sulfur , Bordeaux mixture, Thiram, MAFA
Ginkgo biboba Linn.	*Hlococerus insularis* Staudinge, *Pseudaulacaspis pentagona* Targioni-Tozzetti, *Clania variegata* Snellen, *Adoretus tenuimaculatus* Waterhouse, *Macrophomina phaseolina* (Tassi), *Rhizoctonia solani* Kuhn, *Alternaria alternate* (Fr.) Keissl	Malathion, Chlorbenzuron$^{\varsigma}$, Neem oil EC, Bordeaux mixture, Thiophanate methyl
Ziziphus jujubea Mill.	*Carposina niponensis* Walsingham, *Scythropus yasumatsui* Kono et Morimoto, *Sucra jujuba* Chu, *Contarinia* sp., *Carposina niponensis* Walsingham, *Iragoides conjuncta (*Walker), *Marumba gaschkewitschi* Bremer et Grey, *Heliococcus zizyphi* Borchsenius, *Ceresium sculpticolle* Gressitt, *Ancylis (Anchylopera)* sativa Liu, MLO, *Ziziphus* sp.	Phoxim, Chlorbenzuron$^{\varsigma}$, Sumicidin, Malathion, Triadimefon, Tetracycline, Triadimefon, Lime sulfur, Bordeaux mixture
Pyrus.bretschneideri.Rend.	*Carposina niponensis* Walsingham, *Grapholitha molesta* Busck, *Halyomorpha halys* (Stal), *Hoplocampa pyricola* Rohwer, *Cacopsylla chinensis* (Yang et Li), *Anthonomus pomorus* Linnaeus, *Bacchisa fortunri* (Thomson), *Aphanostigma jakusuiensis* (Kishida), *Acronicta hercules* Felder, *Cydia prunivora*(Walsh), *Scintillatrix limbata* (Gebler), *Venturia pyrina* Aderh, *Physalospora piricola* Nose, *Gymnosporangium haraeanum* Syd., *Botryosphaeria* sp., *Mycosphaerella sentino* (Fr.)	Dipterex, Phoxim, Imidacloprid, Sumicidin, Malathion, Imidacloprid$^{\varsigma}$, Thiophanate methyl, Tuzet, Carbendazim, Manage, Polyoxin, Diniconazole, Lime sulfur

Diospyros kaki Linn.f.	*Eriococcus kaki* Kuwana, *Kakivoria flavofasciata* Nagano, *Hypocala moorei* Butler, *Lymantria dispar* Linnaeus, *Aromia bungii* (Faldermann), *Popillia mutans* Newman, *Culcula panterinaria* Bremer et Grey, *Acanthococcus KaKi* Kuwana, *Tenuipalpus zhizhilashviliae* Reck, *Pseudocercospora kaki* Goh & Hsieh, *Gloeosporium kaki* Hori, *Phyllactinia kakicola* Sowada	1.8%Abamectin EC, Phoxim, Cypermethrin, Acetamiprid, Steinernema feltiae, Bt., Beauveria bassiana, Metarhizium anisopliae, Thiophanate methyl, Chlorothalonil, Mancozeb
Zanthoxylum bungeanum. Maxim.	*Aphis gossypii* Glover, *Embrik-Strandia* bimaculata (White), *Philosamia cynkeri* walkeri(Felder), *Papilio polytes* Linnaeus, *Hypothenemus eruditus* Westwood, *Aleurolobus marlatti* Quaintance, Gibber-ella pulicaris(Fries.)Sacc *Coleosporium zanthoxyli* Diet. et Syd. *Phoma* sp.	Imidacloprid, Tuzet, Zineb, Lime sulfur , Bordeaux mixture, Triadimefon
Diospyros lotus.Linn	*Eriococcus kaki* Kuwana, *Kakivoria flavofasciata* Nagano, *Hypocala moorei* Butler, *Lymantria dispar* Linnaeus, *Aromia bungii* (Faldermann), *Popillia mutans* Newman, *Culcula panterinaria* Bremer et Grey, *Pseudocercospora kaki* Goh & Hsieh, *Gloeosporium kaki* Hori, *Phyllactinia kakicola* Sowada	1.8%Abamectin EC, Phoxim, Acetamiprid, Steinernema feltiae, Bt., Beauveria bassiana, Metarhizium anisopliae, Thiophanate methyl, Chlorothalonil, Mancozeb
Camellia sinensis Linn.	*Junkowskia athlete* Oberthur, *Arcornis alb*a (Bremer), *Clania minuscule* Butler, *Breipalpus obovatus* Donnadieu, *Physopelta cincticollis* Stal, *Myllocerinus aurolineatus* Voss, *Gloeosporium theae-sinensis* Miyake *Pestalotiopsis theae* (Sawada)Stey., *Colletotrichum gloeosporioides* Penz.	Phoxim, Sumicidin, Malathion, Chlorbenzuron$^{\varsigma}$, Imidacloprid$^{\varsigma}$, , Chlorfluazuron$^{\varsigma}$, Carbendazim, Chlorothalonil, Thiophanate methyl, Tuzet

Prunus Persica(Linn.)Batsch	*Aromia bungii* (Faldermann), *Illiberris nigra* Leech, *Erythroneura sudra* (Distant), *Spilonota albicana* (Motsch.), *Acronicta incretata* Hampson, *Carposina niponensis* Walsingham, *Dichocrocis punctiferalis* (Guenee), *Grapholitha molesta* Busck, *Myzus persicae* (Sulzer), *Sanninoidea* exitiosa, *Pseudaulacaspis pentagona* Targioni-Tozzetti, *Taphrina deformans* (Berk.)Tul., *Cercospora cirumscissa* Sacc.	Beauveria bassiana, Malathion, Bt, Lime sulfur, Meothrin, Thiophanate methyl, Tuzet, Lime sulfur , Bordeaux mixture
Punica granatum Linn.	*Zeuzera coffeae* Nietner, *Aphis gossypii* Glover, *Pseudococcus comstocki* Kuwana, *Dolycoris baccarum* (Linnaeus), *Dichocrocis punctiferalis* (Guenee), *Carposina niponensis* Walsingham, *Ceroplastes japonicus* Green, *Eriococcus lagerstroemiae* Kuwana, *Zythia versoniana* Sacc, Brwon spot diseases	Malathion, Imidacloprid, Chlorbenzuron$^{\varsigma}$, Neem oil EC, Carbendazim, Mancozeb, Zineb, Lime sulfur , Polyoxin
Var.Spinosa(Bunge)Huex H.F.Chav	*Phytoscaphus gossypii* Chao, *Cocephalus japanus* Baly, *Xylotrechus chinensis* Chevrolat, *Ancylis (Anchylopera)* sativa Liu, *Cnidocampa flavescens* Walker, *Latoia hilarata* Walker, *Thosea sinensin* Walker, MLO	1.8%Abamectin EC, Cypermethrin, Chlorbenzuron$^{\varsigma}$, Phoxim, Acetamiprid, Dipterex, Bt., Beauveria bassiana
Hibiscus syriacus Linn.	*Spilarctia subcarnea* (Walker), *Heliothis armigera* Hubner, *Earias cupreoviridis* Walketr, *Anomis flava* (Fabricius), *Diaphania indica* (Saunder), *Zeuzera coffeae* Nietner, *Aphis gossypii* Glover, *Parlatoreopsis chinensis* (Marlatt), *Sphaerotheca fuliginae* *Colletotrchum* spp	1.8%Abamectin EC, Phoxim, Chlorbenzuron$^{\varsigma}$, Acetamiprid, Dipterex, Bt., Thiophanate methyl, Chlorothalonil
Lour.	*Chrysomela saliceti*(Weise) , aphids, *Cyphosoma tataricum* (Pall.)	1.8%Abamectin EC, Matrine, Phoxim Imidacloprid, Acetamiprid

Gleaitsia Sinensis lam.	*Euphlerus robinae* Shinji, *Lopholeucaspis jsponica* （Cockerell）, aphids, mites	1.8%Abamectin EC, Phoxim, Imidacloprid
Nitraria sibirica pall.	*Orgyia ericae* Germar., leafminers, *Rhizoctonia*	1.8%Abamectin EC, Phoxim, Acetamiprid, Pentachloronitrobenzene, Zineb, Carbendazim
Myricaria Platyphylla Maxim.	*Stilpnotia salicis* (Linnaeus)	1.8%Abamectin EC, Chlorbenzuron$^{\varsigma}$, Phoxim
Salix Linearistipularis (Franch)Hao	*Maladera orientalis* Motschulsky, *Proagopertha lucidula* Fald, *Aphis farinose* Gmelin	1.8%Abamectin EC, Buprofezin, Phoxim, Imidacloprid
Amorpha fruticosa Linn.	*Acanthoscelides plagiatus* Reiche et Saulcy, *Zeugophora nigricollis* (Jacobi), *Epicauta chinensis* Laporte, *Cletus tenuis* Kiritshenko, *Holotrichia oblita* Faldermann, *Zeuzera coffeae* Nietner, *Thalera chlorosaria* Graeser, Leaf spot diseases	1.8%Abamectin EC, Chlorbenzuron$^{\varsigma}$, Phoxim, Acetamiprid, Dipterex, Bt., Thiophanate methyl, Chlorothalonil, Polyoxin
Elaeagnus angustifolia Linn.	*Julodis variolaris* Pall, *Apocheima cinerarius* Erschoff, *Melanophila decastigma* Fabr. Celerio lineate livornica (Esper), *Malacosoma Neustria testacea* Motsch., scales, mites	1.8%Abamectin EC, Phoxim, Neem oil EC, Acetamiprid, Dipterex, Bt., Beauveria bassiana, Metarhizium anisopliae
Vitex negundo Linn.	*Astathes episcopalis*, *Polyzonus fasciatus* (Fairmaire), *Astathes episcopalism* Chevrolat, *Xyleborus rubicollis* Eichhoff, *Adosomus granulosus* Mannerhein, *Chrysolina virgata* (Motsch.), *Aphis gossypii* Glover	1.8%Abamectin EC, Phoxim, Cypermethrin, Acetamiprid, Beauveria bassiana, Metarhizium anisopliae, Imidacloprid
Prunus japonica Thunb.	Aphids, mites	1.8%Abamectin EC, Acetamiprid, , Neem oil EC,

Lespedeza bicolor Turcz.	*Setora postornata* (Hampson), *As trifidus* (Pascoe), *Cryptocephalus amiculus*, *Lilioceris ruficollis* (Baly), *Cyclopelta parva* Distana, *Icerya purchase* Maskell	1.8% Abamectin EC, Phoxim, Dipterex
Forsythia suspensa (Thunb.)Vahl.	Unaspis yanonensis Kuwana, *Clania minuscule* Butler	1.8%Abamectin EC, Neem oil EC, Chlorbenzuron$^{\varsigma}$
Grewia biloba G.Don var parviflora(Bunge)Hand.-Mazz.	aphids, mites	1.8%Abamectin EC, Acetamiprid, , Clofetezine, Santonin, Neem oil EC,
Lonicera japonica Thunb.	*Xylotrechus grayii* White, *Heterolocha jinyinhuaphaga* Chu, *Microsphaera lonicerae* (DC.)Wint.	1.8%Abamectin EC, Cypermethrin, Chlorbenzuron$^{\varsigma}$, Phoxim, Thiophanate methyl, Triadimefon

Annotation: Pesticides with"$^{\varsigma}$" are biopesticides； all materials here are from statistical data from prefectural cities and counties.

2.4 Reccomended pesticides list

According to IPM and pesticide purchase guidance of the World Bank (Operation policy 4.09), following pesticides are suggested for applying in SEAP. Additional pesticide could be approved during the SEAP charring out. But before it could add into the list, the detail pesticides information should be provided to the World Bank.

Table 2 Recommended pesticides list

Tree species	Pest species	pesticides	Standard level(WHO)
Pinus thunberii Parl.	*Bursaphelenchus xylophilus* (Steiner et Buhrer) Nickle *Cenangium ferruginosum* Fr.	Thiophanate methyl Chlorothalonil	III III
	Dendrolimus spectabilis (Butler) *Matsucoccus matsumurae* (Kuwana) *Dioryctria rubella Hampson*	1.8%Abamectin EC Teflubenzuron Fenoxycarb Diflubenzuron Abamectin·Diflubenzuron Bt$^{\varsigma}$ Aloperine Chlorbenzuron$^{\varsigma}$	III III III III III III IV III

Quercus Linn.spp.	*Pestalotiopsis* sp. *Uncinula septata* Salm	Thiophanate methyl Wuyiencin$^{\varsigma}$ Agricultural Antibiotic120$^{\varsigma}$ Mancozeb	III IV IV III
	Phalera assimlis Brener et Grey *Phalerodonta albibasis*(Chiang) *Lymantria dispar* Linnaeus *Fentonia ocypete* Brener *Hyperythra oblique* Warren,	1.8%Abamectin EC Phoxim Chlorbenzuron$^{\varsigma}$ Beauveria bassiana$^{\varsigma}$	III III III IV
*Platycladus orientalis*Franco.	*Dendrolinus suffscus* Lajonquiere *Parocneria furva* (Leech) *Cinara tujafilina* (del Guercio) *Oligony chus perditus* Prichard et Baker *Semanotus bifasciat*us (Motschulsky) *Xyleborus rubicollis* Eichhoff	1.8%Abamectin EC Chlorbenzuron$^{\varsigma}$ Malathion Acetamiprid Beauveria bassiana$^{\varsigma}$ Bt$^{\varsigma}$ Cypermethrin Liuyangmycin$^{\varsigma}$	III III III III IV III III IV
Cotinus coggygria Sap.var.cinerea Engl.	*Uncinula verniciferae* Phenn *Verticillium dahliae* Kleb	Thiophanate methyl Agricultural Antibiotic120$^{\varsigma}$ Lime sulfur	III IV III
	Locastra muscosalis Walker *Calophya rhois* (Low) *Ophrida xanthospilota*(Baly) aphid	1.8%Abamectin EC Imidacloprid Acetamiprid Santonin	III III III III
Sorbus pohuashanensis(Hance) Heal.	*Meloidogyne arenarie* (Neal)chitwood	Paecilomyces lilacinus $^{\varsigma}$ Dazomet	IV III
	Sinomphisa plagialis(Wileman) *Psilogramma menephron*(Cramer)	1.8%Abamectin EC Chlorbenzuron Imidacloprid DCIP	III III III III
Populus.tomentosa carr.	*Paranthrene tabaniformis* Rott *Clostera annachoreta* (Erschoff) *Apocheima cinerarius* Erschoff *Apriona germari* (Hope) *Saperda populnea* Linnaeus *Eriophyes dispar* Nal.	BEAUVERIA BASSIANA$^{\varsigma}$ Phoxim Clofetezine Imidacloprid Chlorbenzuron$^{\varsigma}$ Cypermethrin BT var$^{\varsigma}$ Entomopathogenic nematodes$^{\varsigma}$	IV III III III III III IV IV
	Dothiorella gregaria Sacc. Bark rot diseases	Thiophanate methyl Carbendazim Mancozeb Bordeaux mixture Lime sulfur Azocyclotin	III III III III III III

Sect Aigeiros Dwby	*Anoplophora glabripennis* (Motsch.) *Apriona germari* (Hope) *Saperda populnea* Linnaeus *Aeolesthes chrysothrix* (Bates). *Paranthrene tabaniformis* Rott *Clostera annachoreta* (Erschoff) *Micromelalopha troglodyta* (Graeser). *Apocheima cinerarius* Erschoff	Cypermethrin Chlorbenzuron$^{\varsigma}$ Imidacloprid Methamidophos EC Beauveria bassiana$^{\varsigma}$ BT var$^{\varsigma}$ Entomopathogenic nematodes$^{\varsigma}$	III III III III IV IV IV
	Bark rot diseases *Dothiorella gregaria* Sacc.	Carbendazim Thiophanate methyl Streptomyces hygrospinosus Bordeaux mixture	III III IV III
Toona. Sinensis (A.Juss.)Roem.	*Phyllactinia toonae* Yuet Lai *Nyssopora cedrelae* (Hori)Franz.	Chlorothalonil Agricultural Antibiotic120 Triadimefon	III IV III
	Cnidocampa flavescens Walker *Latoia consocia* Walker *Thosea sinensin* Walker *Hypsipyla* sp.	1.8%Abamectin EC Chlorbenzuron$^{\varsigma}$ Chlorfluazuron$^{\varsigma}$	III III III
Fraxinus velutina Torr.	*Batocera horsfieldi*（Hope） *Hyphantria cunea* (Drury) *Hlococerus insularis* Staudinge *Zeuzera coffeae* Nietner *Parthenolecanium orientalis* Borchsenius *Eeicerus pe-la* Chavannes *Cnidocampa flavescens* Walker *Latoia consocia* Walker *Temnaspis nankinea* (Pic)	1.8%Abamectin EC Cypermethrin Chlorbenzuron$^{\varsigma}$ Resin wash Phoxim Acetamiprid Steinernema feltiae Bt$^{\varsigma}$. Beauveria bassiana$^{\varsigma}$ Metarhizium anisopliae$^{\varsigma}$	III III III III III III IV IV IV IV
Ulmus pumila Linn.	*Pyrrhalta aenescens* (Fairmaire) *Anoplophora glabripennis* (Motsch.) *Apriona germari* (Hope) *Epicopeia mencia* Moore *Callambulyx tatarinovii* (Bremer et Grey)	1.8%Abamectin EC Cypermethrin Chlorbenzuron$^{\varsigma}$ Phoxim Acetamiprid Steinernema feltiae Bt. Beauveria bassiana Metarhizium anisopliae	III III III III III IV IV IV IV
Robinia pseudoacacia Linn.	*Dothiorella gregaria* Sacc.	Thiophanate methyl Carbendazim Mancozeb Bordeaux mixture Lime sulfur Chlorothalonil	III III III III III III

	Euproctis flaua (Bremer) Geometridae *Clania variegata* Snellen	1.8%Abamectin EC Chlorbenzuron$^{\varsigma}$ Phoxim Acetamiprid Methamidophos Phoxim Beauveria bassiana	III III III III III III IV
Salix matsudana koidz.	*Valsa sordida* Nits.	Chlorothalonil Pine tar Dioctyl divinyltriamino glycine	III III III
	Anoplophora glabripennis (Motsch.) *Trirachys oriertalis* Hope *Smaragdina aurita hammarstraemi* (Jacobson) *Stilpnotia candida* Staudinger *Orgyia antique* (Linnaeus) *Gypsonoma minutana* Hubner *Cnidocampa flavescens* Walker *Latoia hilarata* Walker *Aphis farinose* Gmelin *Ailus nipponigena* Obenberger	1.8%Abamectin EC Cypermethrin Chlorbenzuron$^{\varsigma}$ Phoxim Acetamiprid Steinernema feltiae Bt. Beauveria bassiana$^{\varsigma}$ Metarhizium anisopliae$^{\varsigma}$	III III III III III IV IV IV
Melia azedarach Linn.	*Cercospora meliae* Ell. et Ev. MLO	Thiophanate methyl Chlorothalonil Polyoxin Tetracycline	III III IV IV
	Parlatoria pergandii Comstock *Lyctus linearis* Goeze *Enarmonia koenigana* Fabricius	1.8%Abamectin EC Neem oil EC Cypermethrin Phoxim	III III III III
Sophora japonica Linn.	*Dothiorella ribis* Gross. Et Dugg. *Microsphaera robiniae* Tai	Thiophanate methyl Chlorothalonil Mancozeb Triadimefon	III III III III
	Apriona swainsoni (Hope) *Semiothisa cinerearia* Bremer et Grey *Sinoxylon anale* Lesne *Pterostoma sinicum* Moore *Cydia trasias* (Meyrick) *Meloe corvinus* Marseul	1.8%Abamectin EC Phoxim Prothiophos Acetamiprid Steinernema feltiae Bt. Beauveria bassiana Metarhizium anisopliae	III III III III IV IV IV IV
Juglans regia Linn.	*Xanthomonas campestris* pv. Juglandis(Pierce)Dye, *Melanconium oblongum* Berk., *Cytospora juglandicola* Ell. et Barth., *Colletotrichum gloeosporioides* Penz.	Thiophanate methyl Zineb Lime sulfur Bordeaux mixture Terramycin Pine tar Dioctyl divinyltriamino glycine Thiram MAFA	III III III III IV III III III III

	Atrijuglans hitauhei Yang,	Prothiophos	III
	Batocerahorsfieldi（Hope）	Chlorbenzuron$^{\varsigma}$	III
	Drosicha corpulenta (Kuwana)	Cypermethrin	III
		Sumicidin	III
		Beauveria bassiana	IV
Castanca mollissima Carr.	*Coryneum kunzei* Carda var. castaneae Sacc. Et Roum	Thiophanate methyl	III
	Cytospora sp.	Chlorothalonil	III
		Pine tar	III
		843 Recovery solution	III
		Dioctyl divinyltriamino glycine	III
	Dryocosmus kuriphilus Yasumatsu	Chlorbenzuron$^{\varsigma}$	III
	Lachnus tropicalis (van der Goot)	Cypermethrin	III
	Dichocrocis punctiferalis (Guenee)	Dipterex	III
	Paratetranychus sp.	Sumicidin	III
	Synanthedon castanevora Yang et Wang	Imidacloprid	III
Prunus armeniaca Linn.	Apricot pox	Lime sulfur	III
	Colletotrichum gloeosporioides Penz.	Bordeaux mixture	III
	Monilinia laxa (Aderh. Et Ruhl.)	Thiram	III
		MAFA	III
	Eurytoma maslovskii Nikolskaya	Phoxim	III
	Grapholitha molesta Busck	Sumicidin	III
	Aromia bungii (Faldermann)	Malathion	III
	Hyaloptera amygdale Blanchard	Sex pheromone	IV
	Didesmococcus koreanus Borchsenius	Entomopathogenic nematodes	IV
	Rhynchites faldermanni Schoenherr		III
	Pseudaulacaspis pentagona Targioni-Tozzetti		
Ginkgo biboba Linn.	*Macrophomina phaseoli* (Maubl.) Ashby	Bordeaux mixture	III
	Rhizoctonia solani Kuhn	Thiophanate methyl	III
	Alternaria alternate (Fr.) Keissl		
	Hlococerus insularis Staudinge	Malathion	III
	Pseudaulacaspis pentagona (Targioni-Tozzetti)	Chlorbenzuron$^{\varsigma}$	III
	Clania variegata Snellen	Neem oil EC	III
	Adoretus tenuimaculatus Waterhouse,		
Ziziphus jujubea Mill.	MLO	Triadimefon	III
	Ziziphus sp.	Lime sulfur	III
		Bordeaux mixture	III
		Tetracycline Hydrochloride	IV

	Carposina niponensis Walsingham *Scythropus yasumatsui* Koneet Merimoto *Ceroplastes japonicus* Green *Contarinia* sp.	Phoxim Chlorbenzuron$^{\varsigma}$ Sumicidin Malathion BT var(BT)	III III III III IV
Pyrus.bretschneideri.Rend.	*Venturia pyrina* Aderh, *Physalospora piricola* Nose *Gymnosporangium haraeanum* Syd. Botryosphaeria sp. *Mycosphaerella sentino(*Fr.)	Thiophanate methyl Tuzet Carbendazim Manage Polyoxin$^{\varsigma}$ Diniconazole Lime sulfur	III III III IV III III III
	Carposina niponensis Walsingham *Grapholitha molesta* Busck *Halyomorpha halys* (Stal) *Hoplocampa pyricola* Rohwer *Psylla chinensis*Yang et Li *Rhynchites foveipennis* Fairmaire	Dipterex Phoxim Imidacloprid Sumicidin Malathion Imidacloprid$^{\varsigma}$	III III III III III III
Diospyros kaki Linn.f.	*Culcula panterinaria* Bremer et Grey, *Pseudocercospora kaki* Goh & Hsieh, *Gloeosporium kaki* Hori, *Phyllactinia kakicola* Sowada	Thiophanate methyl Chlorothalonil Mancozeb	III III III
	Eriococcus kaki Kuwana *Kakivoria flavofasciata* Nagano *Hypocala moorei* Butler *Lymantria dispar* Linnaeus *Aromia bungii* (Faldermann) *Popillia mutans* Newman	1.8%Abamectin EC Phoxim Cypermethrin Acetamiprid Steinernema feltiae Bt. Beauveria bassiana$^{\varsigma}$ Metarhizium anisopliae$^{\varsigma}$	III III III III IV IV IV IV
Zanthoxylum bungeanum. Maxim.	Gibber-ella pulicaris(Fries.)Sacc *Coleosporium zanthoxyli* Diet. et Syd. *Phoma* sp.	Tuzet Carbendazim Triadimefon Lime sulfur Bordeaux mixture	III III III III III
	aphids	Imidacloprid	III
Diospyros lotus.Linn	*Culcula panterinaria* Bremer et Grey, *Pseudocercospora kaki* Goh & Hsieh, *Gloeosporium kaki* Hori, *Phyllactinia kakicola* Sowada	Thiophanate methyl Chlorothalonil Mancozeb	III III III

	Eriococcus kaki Kuwana *Kakivoria flavofasciata* Nagano *Hypocala moorei* Butler *Lymantria dispar* Linnaeus *Aromia bungii* (Faldermann) P*opillia mutans* Newman	1.8%Abamectin EC Phoxim Acetamiprid Steinernema feltiae Bt. Beauveria bassiana$^{\varsigma}$ Metarhizium anisopliae$^{\varsigma}$	III III III IV IV IV IV
Camellia sinensis Linn.	*Gloeosporium theae-sinensis* Miyake *Phyllosticta theaefolia* Hara *Exobasidium vexans* Massee	Carbendazim Chlorothalonil Thiophanate methyl Tuzet Mancozeb	III III III III III
	Ectropis obliqua Warren *Arcornis alba* (Bremer)	Phoxim Sumicidin Malathion Chlorbenzuron$^{\varsigma}$ Imidacloprid$^{\varsigma}$ Chlorfluazuron$^{\varsigma}$	III III III III III IV
Prunus Persica(Linn .)Batsch	*Taphrina deformans* (Berk.) Tul *Xanthomonas campestris* pv. pruni (Smith). Dowson	Thiophanate methyl Tuzet Lime sulfur Bordeaux mixture	III III III III
	Carposina niponensis Walsingham; *Dichocrocis punctiferalis* (Guenee); *Grapholitha funebrana* Treitscheke; *Myzus persicae* (Sulzer); Sanninoidea exitiosa; *Pseudaulacaspis pentagona* Targioni-Tozzetti	Malathion Meothrin BT$^{\varsigma}$ Chlorbenzuron$^{\varsigma}$ Engine Oil EC Beauveria bassiana$^{\varsigma}$	III III IV III III IV
Punica granatum Linn.	*Zythia versoniana* Sacc, Brwon spot diseases	Carbendazim Mancozeb Zineb Lime sulfur Polyoxin$^{\varsigma}$	III III III III IV
	Dichocrocis punctiferalis (Guenee) *Carposina niponensis* Walsingham *Ceroplastes japonicus* Green *Eriococcus lagerstroemiae* Kuwana	Malathion Imidacloprid Chlorbenzuron$^{\varsigma}$ Neem oil EC	III III III III
Var.Spinosa(	MLO	Tetracycline	

Bunge)Huex H.F.Chav	*Phytoscaphus gossypii* Chao *Cryptocephalus* sp. *Xylotrechus chinensis* Chevrolat *Ancylis sativa* Liu *Cnidocampa flavescens* Walker *Latoia hilarata* Walker *Thosea sinensin* Walker	1.8%Abamectin EC Cypermethrin Chlorbenzuron$^{\varsigma}$ Phoxim Acetamiprid Dipterex Bt$^{\varsigma}$. Beauveria bassiana$^{\varsigma}$	III III III III III III IV IV
Hibiscus syriacus Linn.	*Sphaerotheca fuliginae* *Colletotrchum* spp	Thiophanate methyl Chlorothalonil Thiram	III III III
	Spilarctia subcarnea (Walker) *Bombyx obsoleta* Fabricius *Earias cupreoviridis* Walketr *Anomis flava* (Fabricius) *Diaphania indica* (Saunder) *Zeuzera coffeae* Nietner *Aphis gossypii* Glover *Parlatoreopsis chinensis* (Marlatt)	1.8%Abamectin EC Phoxim Chlorbenzuronς Acetamiprid Dipterex Bt.$^{\varsigma}$	III III III III III IV
Tamarix. Chinensis Lour.	*Diorhabda elongata deserticola* Chen aphids *Cyphosoma tataricum* (Pall.)	1.8%Abamectin EC Matrine Phoxim Imidacloprid Acetamiprid	III III III III III
Gleaitsia Sinensis lam.	*Euphlerus robinae* Shinji aphids mites	1.8%Abamectin EC Phoxim Imidacloprid	III III III
Nitraria sibirica pall.	*Rhizoctonia*	Pentachloronitrobenzene Zineb Carbendazim	III III III
	Orgyia ericae Germar. leafminer	1.8%Abamectin EC Phoxim Acetamiprid	III III III
Myricaria Platyphylla Maxim.	*Stilpnotia salicis* (Linnaeus)	1.8%Abamectin EC Chlorbenzuron$^{\varsigma}$ Phoxim	III III III
Salix Linearistipularis (Franch)Hao	*Maladera orientalis* Motschulsky *Proagopertha lucidula* Fald	1.8%Abamectin EC Buprofezin Phoxim Imidacloprid	III III III III
Amorpha fruticosa Linn.	Leaf spot diseases	Thiophanate methyl Chlorothalonil Polyoxin$^{\varsigma}$	III III IV

	Acanthoscelides plagiatus Reiche et Saulcy *Zeugophora nigricollis* (Jacobi) *Epicauta chinensis* Laporte *Cletus punctiger* (Dallas) *Holotrichia oblita* Faldermann *Zeuzera coffeae* Nietner *Thalera chlorosaria* Graeser	1.8%Abamectin EC Chlorbenzuronς Phoxim Acetamiprid Dipterex Btς.	III III III III III IV
Elaeagnus angustifolia Linn.	*Julodis variolaris* Pall *Apocheima cinerarius* Erschoff *Melanophila decastigma* Fabr *Hyles gallii* (Rottemburg) *Malacosoma neustria testacea* Motsch. scales red mites	1.8%Abamectin EC Phoxim Neem oil EC Acetamiprid Dipterex Bt. ς Beauveria bassianaς Metarhizium anisopliaeς	III III III III III IV IV IV
Vitex negundo Linn.	*Astathes episcopalis* *Polyzonus fasciatus* (Fairmaire) *Astathes episcopalism* Chevrolat *Xyleborus rubicollis* Eichhoff *Adosomus granulosus* Mannerhein *Chrysolina virgata* (Motsch.) *Aphis gossypii* Glover	1.8%Abamectin EC Phoxim Cypermethrin Acetamiprid Imidacloprid Beauveria bassianaς Metarhizium anisopliaeς	III III III III III IV IV
Prunus japonica Thunb.	aphids mites	1.8%Abamectin EC Acetamiprid Neem oil EC	III III III
Lespedeza bicolor Turcz.	*Setora postornata* (Hampson) *As trifidus* (Pascoe) *Cryptocephalus amiculus* *Lilioceris ruficollis* (Baly) *Cyclopelta parva* Distana *Icerya purchase* Maskell	1.8%Abamectin EC Phoxim Dipterex	III III III
Forsythia suspensa (Thunb.)Vahl.	*Unaspis yanonensis* Kuwana	1.8%Abamectin EC Neem oil EC Chlorbenzuronς	III III III
Grewia biloba G.Don var parviflora(Bunge)Hand.-Mazz.	Aphids mites	1.8%Abamectin EC Acetamiprid Clofetezine Santoninς Neem oil EC	III III III III III
Lonicera japonica	*Microsphaera lonicerae* (DC.)Wint.	Thiophanate methyl Triadimefon	III

Thunb.	*Xylotrechus grayii* White *Heterolocha jinyinhuaphaga* Chu	1.8%Abamectin EC Cypermethrin Chlorbenzuron^{ς} Phoxim	III III III III

Annotation: (1)Pesticides with"^{ς}" are biopesticides (2)In case of new pests that could not be effectively controlled by the listed pesticides, additional pesticides could be used. However, all use of pesticides must comply with the requirements and compliance with the World Bank and China's policies and regulations.

2.5 Monitoring on forest pests management

2.5.1 Aim and requirement

In order to to guide the pest & disease control of protection forest plantation in SEAP by following forest protection policy "proactive, scientific and legal efforts on prevention and control for healthy forest", to strengthen the environmental outcomes and minimize the negative impact to environment, to ensure the fulfillment of environemental outcomes, key components of pest & disease monitoring include the following:

(1) Development of the training materials and plans for IPM and safe use of pesticides

(2) Start IPM and pesticide safety usage training programme to project technicians and farmers involved in SEAP in counties and towns;

(3) Effective monitoring and forecast on the stage and damage degree of the main pests on tree species in SEAP

(4) Selection, procurement, distribution and use of most appropriate pesticides and devices as approved for the project areas.

(5) Monitoring the implementation of „Intergrated pest management plan".

2.5.2 Monitoring sites arrangement

Four levels monitoring sites (province, prefectural cities, counties, towns) will be set up in the afforestation in SEAP. At least 1 provincial site in prefectural cities, 2 sites for each prefectural city, 3 sites for each county should be set up. The forest pest status information could be got from monitoring data in time, and the information about the training effectiveness and pest safety usage could be tracked through the 3 level monitoring sites. The pest information in SEAP monitoring sites will be the routine work of the wildlife conservation stations at same level.

2.5.3 Monitoring data collection and application

Monitoring the pest & disease is enlisted in the overall M&E plan for SEAP, and indicators of infectious index, damaged area of forest defoliator and borer can be referenced in overeall project plan. County PMO is responsible for the monitoring and collecting data in table 3 as follows. Damage level is ranked as: level Ⅰ< level Ⅱ<level Ⅲ <level Ⅳ< level Ⅴ. Level Ⅰ and level Ⅱ are considered as minor damage, while level Ⅲ as medium damage, and level Ⅳ and level Ⅴ as severe damage. In extensively managed forest plantation suach as protection plantation in SEAP, only damage of level Ⅳ and level Ⅴ will trigger a response of control. This would help reduce the application of pesticides and minimize the negative environmental impact.

Table 3 Indicators monitored in pest & disease mangement

Damaged area of each level(ha)						Training			Safe application of pesticides		
Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅴ		Materials delivered (copy)	Person.times at township level	Person.times at afforestation entities	Use of pesticides recommended (%)	Pesticides quantity applied （kg）	Percentage of measures in IPM (%)

The county PMOs and the wildlife conservation stations take the responsibilities of surveys and observations in monitoring sites at all levels. The collected data will be report to up levels, and by review all the data, the forecast on ranges, stages and degrees of the pests will be published by provincial PMO.

The county PMOs are also responsible for collecting information on IPM status, varieties and safety usage knowledge of pesticides application, purchased pesticides list etc. The random sample ratio will be no less than 5% of the participants in pest control season and pesticides procurement. The evaluations of the IPM and pesticides safety usage of the participant counties will be based on the samples. The conclusion should be report to up level PMOs two times a year, June 30 and December 31.

3. Organization and Management

3.1 Organization

PMOs at all levels take the responsibilities of implementing the integrated pest management plan. Specific responsibilities include guiding the implementation of the lower levels, training technician staffs and farmers at all levels, monitoring training and implementation of IPM management of the project.

Consulting with World Bank, the provincial PMO will approve the pesticides list. And only the pesticides in the list could be financed by the project fund. The PMOs at all levels should keep the procurement log files for inspection.

The provincial PMO will amend the pesticides list according the sale pesticides in provinces. The technicians and farmers training by the PMOs at all levels will be based on the list. The training by county PMOs and implement of the IPM will be monitoring and supervised by up levels.

The county PMOs is responsible for training township technicians and the farmers, and guiding the work of IPM.

The provincial PMO will formulate the general principles and methods of the IPM in SEAP, and give specific recommendations for the tree species in the project. The prefectural PMO should give detailed guidance and explanations on the general principles for actual situation and training adaption to technicians and farmers.

3.2 Pesticides management

The provincial PMO will make policy on pesticides test and analysis, and approve the procurement for pesticides. The county PMOs will implement the procurement commissioned by the prefectural PMOs on project policy.

Each afforestation individual farmers or organizations should draw out the plan to county PMOs about the requirement of pesticide names and dosages according the pest monitoring results. The county PMOs sum up and made the plan and report to prefectural PMOs.

The prefectural PMOs and provincial PMO make the procurement plan and pesticides list together.

The pesticides should be sent under escort by technicians, to ensure the safety and in time. In case of the pesticide container damage, the effective emergency response should start in time. The transportation and delivery record files should be kept by county PMOs.

The Forest bureaus of participant counties should provide facilities to the pesticides. The other pesticides services or distributors should check and maintaince theirs own facilities.

The technicians in counties and towns will identify the pests, and provide specific IPM recommendations for approval pesticides application. The provincial experts or organizations will help in need. It should including the following individuals and organizations: provincial forest pests and diseases control station, plant protection departments in the related agricultural or forestry universities, forest experts.

3.3 Safety usage of pesticides

Recommended to follow the following steps:

(1) Scientific pesticide application training before practice to farmers according to the afforest tree species and the monitoring reports by county PMOs and wildlife conservation stations.

(2) The farmers could get pesticides directly from county PMOs if a great deal needed. A small quantity needed could be got directly from the town pesticide distributor stores, in which there are approval pesticides by county PMOs.

(3) Various pesticide application methods should be carried out according to the pest species, biological characteristics, and damage area and injury level. The technicians in wildlife conservation stations, should provide the information of right pesticides and spraying routes on specific pest and tree species

(4) The specific recommendations for local pest and conditions will be presented by related experts organized by prefectural PMOs. The experts will from the following organizations: Shangdong forest pests and diseases control station, plant protection departments in agricultural universities, Shangdong economic forest station, and research institute of forest protection in Shangdong academy of forestry.

(5) The regular pesticides application period should be considered, to reduce the increasing of the pest resistances and the damage to the host plants. The

recommendations will be presented by related experts, and be put into training programme, technical guidance and pesticides procurement criteria.

(6) The training of safety pesticides usage and application techniques will cover all participant farmers.

(7) The training will emphasis on the importance of wearing shield suits in pesticide application. The suits are including shield clothes, helmets, masks, gloves and shoes. The left pesticides should be safe store and handling.

(8) The training should strengthen the abidance of the pesticide application rules, to avoid pesticides pollution on residential area, water resources and rangeland;

(9) All the left pesticides should be returned to appointed storages. The empty containers should be also callback or safe handling (deep bury).

(10) The county PMOs and township technicians will emphasis on the importance of the effective procedure on pesticide management will be emphasis.

3.4 Procurement of pesticides

Each afforestation individual farmers or organizations should draw out the plan to county PMOs about the requirement of pesticide names and dosages according the pest monitoring results. The county PMOs sum up and made the plan and report to prefectural PMOs. Totals will sum up by prefectural PMOs and provincial PMO, to see if the bulk purchased needed.

The pesticides procurement should follow the rules on “Material and equipment procurement practices of the world bank project”, and be financed by matching fund. The county PMOs take the responsibilities of procurement if a great deal pesticides are needed by township organizations. A small number of pesticides needed could be purchased directly in the local pesticide distributor stores according to approval list. The provincial PMO formulate the policy on pesticide procurement examination and approval, to ensure the pesticides purchased by project fund are on the approval list.

3.5 Training

The specific training classes will be hold to the county and township technicians, the participant farmers will be trained on the related tree species. The prefecture cities will hold the training classes on IPM recommendation and safety usage of pesticides on specific tree species for each city.

The provincial PMO will amend the plan with the actual situation and progress. The prefectural city PMOs will arrange the training programmes based on this plan, and prepare the training materials and plans for county and township technicians. The county PMO is responsible for the farmer training and field demonstration materials.

3.5.1 Training activities

- Laws and legislation: including Forest Law, Forestry Pest Control Regulations, IPM Plan, World Bank Policy etc., and will adjust according to trainee level.

- Techniques training: Pest identification, life cycle, biological characteristics, control techniques, basic pest knowledge, pesticide safety usage and management. and will adjust according to trainee level.

- Field demonstration: the farmers field demonstration on right and safety pesticides application.

3.5.2 Training organization

The training will be hold and organized as follows:

- Shandong PMO is in charge of training technicians from project prefectures and partial project counties.

- The prefectural level training by prefectural PMOs, the trainees are technicians from counties; the provincial PMO will inspect the prefectural level training classes.

- The wildlife conservation stations are responsible for the training of the township technicians, and prefectural city PMOs will inspect the county level training classes.

- The township technicians will demonstrate in field practice to farmers on toxicity, residual period and safety application of the pesticide. County PMO will trace the training practice at township level.

The prefectural and county PMOs should plan and arrange training programmes each year about the IPM requirements and local problems. The detail arrangements should report to higher level for inspection.

3.5.3 Training plan and budget

During project implementation, each prefectural city should make the general training plan and budget, including details about each year training times according to tree species,

numbers of trainees, training place, training activities and materials. The detail year training plan should be approved by provincial PMO. The budget should have detail information about training materials and unit cost for each person each day. The financial paying for the training will be based on the (1) training materials, (2) training record (numbers of trainees, teachers and training days)

The provincial PMO will amend the following budget draft in table 3 according to the detail training budget and plans by prefectural PMOs.

Table 4 Training budget

Training activities	Trainees	NO. of training course	Person.times	Cost(10 thousands RMB)
Total		**539**	**88100**	**75.8**
1. Provincial level		**1**	**30**	**5. 4**
(1) Laws and legislation	Prefecture PMO	1	30	5. 4
(2) Pesticide safety usage and management				
(3) Forest and forest pest control techniques				
2. Prefectural level		**18**	**120**	**12. 8**
(1) Pest control techniques and Pesticide safety usage	County PMO	9	60	6. 4
(2) Pest identification, life cycle, biological characteristics, etc	County PMO	9	60	6. 4
3. County Level		**120**	**2950**	**23. 6**
Field demonstration once a year for each project area on pest control and pesticide safety usage	Township or forest farm technicians	120	2950	23. 6
4. Township level		400	85000	34.0
Field demonstration once a year for each project area on pest control and pesticide safety usage	Afforestation entities or households	400	85000	34.0

Annotation: Each prefectural city PMO will provide a general training plan and year detail plan and budget

Annex 1: The main pest species list on afforest tree species in SEAP

1.赤松毛虫 *Dendrolimus spectabilis* (Butler)

2.日本松干蚧 *Matsucoccus matsumurae* (Kuwana)

3.松梢螟 *Dioryctria rubella* Hampson

4.松材线虫病 *Bursaphelenchus xylophilus* （Steiner et Buhrer）Nickle

5.松枝枯病 *Cenangium ferruginosum* Fr.

6.黄掌舟蛾 *Phalera assimlis* Brener et Grey

7.栎褐舟蛾 *Phalerodonta albibasis*(Chiang)

8.舞毒蛾 *Lymantria dispar* Linnaeus

9.栎粉舟蛾 *Fentonia ocypete* Brener

10.麻栎褐斑病 *Pestalotiopsis sp*.

11.栎类百粉病 *Uncinula septata* Salm

12.侧柏松毛虫 *Dendrolinus suffscus* Lajonquiere

13.柏毒蛾 *Parocneria furva* (Leech)

14.柏大蚜 *Cinara tujafilina* (del Guercio)

15.柏小爪螨 *Oligony chus perditus* Prichard et Baker

16.双条杉天牛 *Semanotus bifasciatus* (Motschulsky)

17.瘤胸材小蠹 *Xyleborus rubicollis* Eichhoff

18.缀叶丛螟 *Locastra muscosalis* Walker

19.黄栌白粉病 *Uncinula verniciferae* Phenn

20.黄栌丽木虱 *Calophya rhois* (Low)

21.黄栌黄萎病 *Verticillium dahliae* Kleb

22.黄斑直缘跳甲 *Ophrida xanthospilota*(Baly)

23.楸蠹野螟 *Sinomphisa plagialis*(Wileman)

24.霜天蛾 *Psilogramma menephron*(Cramer)

25.根结线虫病 *Meloidogyne arenarie* (Neal)chitwood

26.黄刺蛾 *Cnidocampa flavescens* Walker

27.褐边绿刺蛾 *Latoia consocia* Walker

28.扁刺蛾 *THosea sinensin* Walker

29.香椿蛀斑螟 *Hypsipyla sp.*

30.香椿白粉病 *Phyllactinia toonae* Yuet Lai

31.香椿叶锈病 *Nyssopora cedrelae* (Hori)Franz.

32.云斑天牛 *Batocerahorsfieldi*（Hope）

33.美国白蛾 *Hyphantria cunea* (Drury)

34.小木蠹蛾 *Hlococerus insularis* Staudinger

35.咖啡豹蠹蛾 *Zeuzera coffeae* Nietner

36.东方胎球蚧 *Parthenolecanium orientalis* Borchsenius

37.白蜡蚧 *Eeicerus pe-la* Chavannes

38.黄刺蛾 *Cnidocampa flavescens* (Walker)

39.黄缘绿刺蛾 *Latoia hilarata* Walker

40.白蜡梢距甲 *Temnaspis nankinea* (Pic)

41.榆蓝叶甲 *Pyrrhalta aenescens* (Fairmaire)

42.光肩星天牛 *Anoplophora glabripennis* (Motsch.)

43.桑天牛 *Apriona germari* (Hope)

44.大红蛱蝶 *Vanessa indica* Linnaeus

45.榆绿天蛾 *Callambulyx tatarinovii* (Bremer et Grey)

46.折带黄毒蛾 *Euproctis fiava* (Bremer)

47.褐纹大尺蛾 *Biston robustum* Butler

48.刺槐蓑蛾 *Acanthopsyche nigraplaga* Wileman

49.豆天蛾 *Clanis bilineata tsingtauica* Mell

50.大球坚蚧 *Eulecanium kuwanai* (Kanda)

51.刺槐绿虎天牛 *Chlorophorus diadema* (Motsch.)

52.刺槐溃疡病 *Fusarium oxysporum* Schlecht.)

53.刺角天牛 *Trirachys oriertalis* Hope

54.杨柳光叶甲 *Smaragdina aurita hammarstraemi* (Jacobson)

55.杨雪毒蛾 *Stilpnotia candida* Staudinger

56.古毒蛾 *Orgyia antique* (Linnaeus)

57.杨柳小卷蛾 *Gypsonoma minutana* Hubner

58.柳蚜 *Aphis farinose* Gmelin

59.柳窄吉丁 *Ailus nipponigena* Obenberger

60.柳树腐烂病 *Valsa sordida* Nits.

61.片糠蚧 *Parlatoria pergandii* Comstock

62.栎粉蠹 *Lyctus linearis* Goeze

63.苦楝小卷蛾 *Enarmonia koenigana* Fabricius

64.星天牛 *Anoplophora chinensis (*Forster)

65.苦楝褐斑病 *Cercospora meliae* Ell. et Ev.

66.苦楝丛枝病 *MLO*

67.锈色粒肩天牛 *Apriona swainsoni* (Hope)

68.槐尺蠖 *Semiothisa cinerearia* Bremer et Grey

69.双齿长蠹 *Sinoxylon japonicum* Lesne

70.槐羽舟蛾 *Pterostoma sinicum* Moore

71.国槐潜蛾 *Cydia trasias* (Meyrick)

72.短翅芫菁 *Meloe corvinus* Marseul

73.槐树枝枯病 *Dothiorella ribis* Gross. Et Dugg.

74.槐树白粉病 *Microsphaera robiniae* Tai

75.核桃举肢蛾 *Atriuglans hetaohei* Yang

76.草履蚧 *Drosicha corpulenta* (Kuwana)

77.木窠尺蠖 *Culcula panterinaria* Bremer et Grey

78.绿尾大蚕蛾 *Actias selene ningpoana* Felder

79.核桃美舟蛾 *Uropyia meticulodina* (Oberthur)

80.核桃毒蛾 *Lymantria juglandis* Chao

81.核桃细菌性黑斑病 *Xanthomonas campestris pv.* Juglandis(Pierce)Dye

82.核桃枝枯病 *Melanconium oblongum* Berk.

83.核桃腐烂病 *Cytospora juglandicola* Ell. et Barth.

84.核桃炭疽病 *Colletotrichum gloeosporioides* Penz.

85.栗瘿蜂 *Dryocosmus kuriphilus* Yasumatsu

86.栗大蚜 *Lachnus tropicalis* (van der Goot)

87.桃蛀野螟 *Conogethes punctiferalis* (Guenee)

88.板栗兴透翅蛾 *Synanthedon castanovora* Yang et Wang

89.椴始叶螨 *Eotetranychus tiliarium* (Hermann)

90.长角凿点天牛 *Stromatium longicorne* (Newman)

91.大圆筒象 *Macrocorynus psittacinus* Redtenbacher

92.中国绿刺蛾 *Latoia sinica* Moore

93.板栗腐烂病 *Cytospora sp.*

94.板栗枝枯病 *Coryneum kunzei Carda var. castaneae* Sacc. Et Roum

95.桃仁蜂 E*urytoma maslovskii* Nikolskaya

96.梨小食心虫 *Grapholitha molesta* Busck

97.桃红颈天牛 *Aromia bungii* (Faldermann)

98.桃粉大尾蚜 *Hyaloptera amygdale* Blanchard

99.朝鲜毛球蚧 *Didesmococcus koreanus* Borchsenius

100.杏虎象 *Rhynchites faldermanni* Schoenherr

101.杏炭疽病 *Colletotrichum gloeosporioides* Penz.

102.杏褐腐病 *Monilinia laxa* (Aderh. Et Ruhl.)

103.桑白盾蚧 *Pseudaulacaspis pentagona* (Targioni-Tozzetti)

104.银杏茎腐病 *Macrophomina phaseolina* (Tassi)

105.银杏叶枯病 *Alternaria alternate* (Fr.) Keissl

106.银杏苗木立枯病 *Rhizoctonia solani* Kuhn

107.桃小食心虫 *Carposina niponensis* Walsingham

108.枣飞象 *Scythropus yasumatsui* Kono et Morimoto

109.枣尺蠖 *Sucra jujuba* Chu

110.枣球蜡蚧 *Eulecanium gigantean* (Shinji)

111.桃蛀果蛾 *Carposina niponensis* Walsingham

112.枣奕刺蛾 *Iragoides conjuncta* (Walker)

113.枣星粉蚧 *Heliococcus zizyphi* Borchsenius

114.枣枝蜡天牛 *Ceresium sculpticolle* Gressitt

115.枣桃六点天蛾 *Marumba gaschkewitschi* Bremer et Grey

116.枣镰翅小卷蛾 *Ancylis (Anchylopera) sativa* Liu

117.枣疯病 *MLO*

118.枣锈病 *Ziziphus sp.*

119.茶翅蝽 *Halyomorpha halys* (Stal)

120.梨实蜂 *Hoplocampa pyricola* Rohwer

121.中国梨喀木虱 *Cacopsylla chinensis* (Yang et Li)

122.梨眼天牛 *Bacchisa fortunri* (Thomson)

123.梨黄粉蚜 *Aphanostigma jakusuiensis* (Kishida)

124.梨剑纹夜蛾 *Acronicta Hercules* Felder

125.梨黄卷蛾 *Archips breviplicana* Walsingham

126.梨花象 *Anthonomus pomorus* Linnaeus

127.梨金缘吉丁 *Scintillatrix limbata* (Gebler)

128.梨黑斑病 *Alternaria kikuchiana* Tanaka

129.梨锈病 *Gymnosporangium haraeanum* Syd.

130.梨黑星病 *Venturia pyrina* Aderh

131.柿绒蚧 *Eriococcus kaki* Kuwana

132.柿梢鹰夜蛾 *Hypocala moorei* Butler

133.无斑丽金龟 *Popillia mutans* Newman

134.柿举肢蛾 *Stathmopoda massinissa* Meyrick

135.柿垫绵蚧 *Eupulvinaria peregrine* Borchsenius

136.柿细须螨 *Tenuipalpus zhizhilashviliae* Reck

137.二斑黑绒天牛 *Embrik-Strandia bimaculata* (White)

138.棉蚜 *Aphis gossypii* Glover

139.樗蚕 *Philosamia cynkeri walkeri*(Felder)

140.核桃咪小蠹 *Hypothenemus eruditus* Westwood

141.玉带凤蝶 *Papilio polytes* Linnaeus

142.花椒褐斑病 *Marssonina zanthoxyla* Lu et Li

143.花椒锈病 *Coleosporium zanthoxyli* Diet. et Syd.

144.马氏粉虱 *Aleurolobus marlatti* Quaintance

145.茶用克尺蛾 *Junkowskia athlete* Oberthur

146.茶白毒蛾 *Arcornis alba* (Bremer)

147.茶蓑蛾 *Clania minuscule* Butler

148.卵形短须螨 *Breipalpus obovatus* Donnadieu

149.小班红蝽 *Physopelte cincticollis* Stal

150.茶丽纹象 *Myllocerinus aurolineatus* Voss

151.茶云纹叶枯病 *Colletotrichum gloeosporioides* Penz.

152.茶轮斑病 *Pestalotiopsis theae* (Sawada)Stey.

153.桃斑蛾 *Illiberris nigra* Leech

154.桃一点斑叶蝉 *Erythroneura sudra* (Distant)

155.桃白小卷蛾 *Spilonota albicana* (Motsch.)

156.桃剑纹夜蛾 *Acronicta incretata* Hampson

157.桃缩叶病 *Taphrina deformans* (Berk.)Tul.

158.桃褐斑穿孔病 *Cercospora cirumscissa* Sacc.

159.紫薇绒蚧 *Eriococcus lagerstroemiae* Kuwana

160.斑须蝽 *Dolycoris baccarum* (Linnaeus)

161.棉尖象 *Phytoscaphus gossypii* Chao

162.酸枣隐头叶甲 *Cocephalus japanus* Baly

163.人纹污灯蛾 *Spilarctia subcarnea* (Walker)

164.棉铃实夜蛾 *Heliothis armigera* Hubner

165.瓜绢野螟 *Diaphania indica* (Saunder)

166.吹绵蚧 *Icerya purchase* Maskell

167.斜带吉丁 *Cyphosoma tataricum* (Pall.)

168.皂角幽木虱 *Euphlerus robinae* Shinji

169.日本长白蚧 *Lopholeucaspis jsponica* （Cockerell）

170.苹毛丽金龟 *Proagopertha lucidula* Faldermann

171.紫穗槐豆象 *Acanthoscelides plagiatus* Reiche et Saulcy

172.黑瘤胸叶甲 *Zeugophora nigricollis* (Jacobi)

173.中国豆芫菁 *Epicauta chinensis* Laporte

174.平肩棘缘蝽 *Cletus tenuis* Kiritshenko

175.华北大黑鳃金龟 *Holotrichia oblita* Faldermann

176.波翅青尺蛾 *Thalera chlorosaria* Graeser

177.沙枣尺蠖 *Apocheima cinerarius* Erschoff

178.八字白眉天蛾 *Celerio lineate livornica* (Esper)

179.黄褐天幕毛虫 *Malacosoma Neustria* testacea Motsch.

180.黄荆眼天牛 *Astathes episcopalism* Chevrolat

181.短翅大粒象 *Adosomus granulosus* Mannerhein

182.绿金叶甲 *Chrysolina virgata* (Motsch.)

183.桑褐刺蛾 *Setora postornata* (Hampson)

184.短胸长足象 *As trifidus* (Pascoe)

185.斑肩负泥虫 *Lilioceris ruficollis* (Baly)

186.金银花尺蛾 *Heterolocha jinyinhuaphaga* Chu

187.金银花白粉病 *Microsphaera lonicerae* (DC.)Wint.

188. 雪毒蛾 *Stilpnotia salicis* (Linneaus)

189. 杨扇舟蛾 *Clostera annachoreta* (Erschoff)