

Country Strategy Paper

*Area-Wide Integrated Pest Management of Fruit Flies
in South and SE Asia Project*

SOCIALIST REPUBLIC OF VIETNAM



National IPM Programme in Vietnam

February 2011

Project Information

“Area-wide Fruit Fly Integrated Pest Management in South and Southeast Asia” is a regional project funded by Taiwan’s ICDF through Global Horticulture Initiative (<http://www.globalhort.org/>) with a focus on adaptation and adoption of fruit fly IPM practices among vegetable and fruit smallholder using Farmer’s Field School (FFS) in the Mekong river basin countries. While the Asian Institute of Technology (AIT; www.ait.asia); Bio-Control Research Laboratory (BCRL; <http://www.pcilindia.com/bcrl.html>), Bangalore, India, and the FAO Regional IPM Programme (<http://www.vegetableipmasia.org/>) are the collaborating project partners, the project is implemented by the National IPM Programmes in Lao PDR, Cambodia, Vietnam; Department of Agriculture Extension (DoAE) Thailand, and Ministry of Agriculture and Irrigation (MAI) in Myanmar. The project is intended to test, promote and socialize among smallholder farmers a range of novel IPM options for fruit fly management within the context of ongoing IPM farmer training and action research programmes in the Mekong basin countries. More information on the project can be seen on its website <http://ipm.ait.asia>

Contacts in Vietnam

The national office of the project is hosted by the Southern Horticultural Research Institute and the Southern Plant Protection Center, at Long Dinh, Chau Thanh, Tien Giang, Vietnam. More information on the project can be obtained from the following contact:



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1 Background

Vietnam has much diversity of tropical horticultural crops including fruit tree and fruiting vegetable crops owing to suitable natural conditions.

In 2008, the area planted to fruit trees in Vietnam was 786,200 ha distributed in the northern and southern regions as follows: northern provinces with 316,800 ha (Red river Delta: 80,800 ha, Northeast: 145,200 ha, Northwest: 35,500 ha, North Center: 55,300 ha) and southern provinces with 469,400 ha (Central Coastal provinces: 30,500 ha, Highland: 26,900 ha, Southeast: 121,600 ha and Mekong Delta: 290,400 ha). In 2009, the yield of fruit trees was around 10 ton/ha with a 40% increase compared with yield in 2002 (7 ton/ha). However, the yield of fruit trees in Vietnam ranged low in comparison to Thailand (55- 60%), China (56%), Thailand (66%), Philippines (35%); and India (60%) - especially citrus, pineapple, and banana.

The Mekong Delta region in Vietnam is the main region for fruit trees and also a big area for vegetable production, since it has good natural conditions. Growers have good knowledge on horticultural techniques. However, the area per household is small, i.e., about 0.4 – 0.5 ha/household. In one orchard farmers grow many different kinds of fruit tree. The linkage amongst farmers is very weak and there is no well organized supply chain. In addition, many pests and diseases occur such as *Huanglongbing* disease on citrus, *Phytophthora* disease on durian, anthracnose disease on mango, citrus, red pepper, etc. The most serious problem is fruit fly both on fruits and fruiting vegetable crops.

Vietnam is one of many countries in South-East Asia that experiences serious pre-harvest losses of fruit and vegetable to fruit flies. Waterhouse (1997) ranked tropical fruit flies as the worst of all invertebrate pests of agriculture throughout South-East Asia and the northern and southern Pacific oceans. The damage levels can limit production with 100% loss of harvestable yield in some cases. During the last 10 years, SOFRI has carried out work on fruit flies. The work includes investigation for fruit fly species, their host range and distribution; establishment and maintenance of fruit fly colonies of *Bactrocera dorsalis*, *B. correcta*, *B. carambolae*, *B. tau* at SOFRI. Protein bait has been produced and tested both in the laboratory and in the field. Work has also been done on the development of different fruit fly measuring strategies. The protein bait has shown the best way for large scale application that has helped to bring down FF population and reduce losses to an acceptable level. However, programmes for mass practical application of effective measures on field conditions have not been done. This project will provide the resources to do more training courses for provincial agricultural staff and farmer field schools to help farmers control fruit fly on a larger scale.

Table1. Fruit production in Vietnam

No.	Location	Area in the year of 2005 (1000 ha)	Area estimated in 2010 (1000 ha)	Production estimated in 2010 (1000ton)
1.	Red River Delta	79.2	90	1,160
2.	Northern highland	178.4	230	1,440
3.	Northern Central region	58.5	80	720
4.	Southern Central Coastal region	30.2	38	300
5.	Western highland	23.1	32	300
6.	South-East region	128.4	150	1,755
7.	Mekong Delta region	269.3	380	4,325
Total		767.1	1,000	10,000

Table 2: Fruiting Vegetable production in Vietnam

Region	Southern of Central Coastal	Western highland	South East region	Mekong Region	Total
Area (ha)	12,308.0	17,633.0	9,520.0	50,270.0	89,731.0
Productivity (100kg/ha)	194.3	226.4	140.5	210.8	204.2
Production (ton)	239,202.5	399,190.5	133,725.6	1,059,915.6	1,832,034.2

Table 3: Area and production of major fruit trees in Vietnam 2004 and 2005

Fruit tree	Area (x1000 ha)		Production (x1000 tonne)	
	2004	2005	2004	2005
Longan *	121.1	120.3	606.4	628.8
Orange, lemon, mandarin	82.7	87.2	540.5	606.4
Pomelo *	28.6	30.4	209.3	242.2
Banana*	102.2	103.4	1,329.4	1,354.3
Lychee, Rambutan*	110.2	113.7	507.5	379.6
Mango	77.5	78.7	337.7	380.9
Pineapple*	44.3	47.4	414.9	472.7
Durian	20.2		146.0	-
Dragon fruit**	8.5	13.5	133.3	-
Grape	2.0	2.0	25.0	26.4

**Export fruit*

*** Number one fruit export*

(Source: MARD 2006)

2. Fruit flies in VIETNAM

Vietnam is one of many countries in South-East Asia that experiences serious pre-harvest losses of fruits and vegetables to fruit flies. Waterhouse (1997) ranked tropical fruit flies as the worst of all invertebrate pests of agriculture throughout South-East Asia and the northern and southern Pacific oceans. The damage levels can limit production with 100% loss of harvestable yield in some cases. During the last 10 years, SOFRI has carried out work on fruit flies. The work includes investigation of fruit fly species, their host range and distribution; establishment and maintenance of fruit fly colonies of *Bactrocera dorsalis*, *B. correcta*, *B. carambolae*, *B. tau* at SOFRI Laboratory for protein bait assessments (both in the laboratory and in the field), host testing, post harvest treatment as well as the development of different fruit fly measuring strategies. One of them, the protein bait, shows the best way for large scale application, which helps bring down their population and reduce the loss due to fruit fly occurrence to an acceptable level.

2.1 Fruit fly species, host range and distribution

The fruit fly species and distribution across Vietnam were investigated by trapping with male lures, methyl eugenol and cue-lure in 26 provinces of South Vietnam. Traps were cleared at 1 to 2 week intervals and maintained for about 12 months in each location. Details of the trapping locations are given in Appendix 1. Along with male lure trapping, fruits and vegetables of major and minor economic importance, as well as some fruits of medicinal value, were collected from various locations across Vietnam and adult fruit flies were reared to establish the infesting species. From the trapping and host reared data a list of fruit flies occurring in Vietnam, their host ranges and distribution was established as described below.

A total of 24 *Bactrocera* and 2 *Dacus* species of fruit flies have so far been identified in Vietnam. Approximately another 20 new *Bactrocera* species have also been collected and these are being studied and described at Griffith University. However, only some *Bactrocera* are pest species and the remaining are of no economic importance. The pest species of major economic importance in Vietnam are: *Bactrocera (Bactrocera) carambolae*, *B. correcta*, *B. cucurbitae*, *B. dorsalis*, *B. tau* and *B. zonata* and *B. pyrifoliae*. Host records have been established for 26 species of fruits and 16 species of vegetables of major economic importance and another 11 species of wild or medicinal plants in Vietnam. These host records form the first comprehensive list of fruit fly hosts provide the required data for Vietnam to begin to comply with ISPM standards as set out under the WTO-SPS agreement governing international trade.

2.2 Control measures being implemented

- **Using of systemic insecticides:** This control measure has been applied previously, but this leads to chemical residues, health and environmental problems, it is no more advisable for controlling fruit fly and the farmers also recognize that since its less effective.
- **Bagging of fruit at a suitable stage:** many fruits and vegetables such as mango, guava, star fruit, star apple, bitter gourd, etc. are being saved by using this technique
- **Trapping with Methyl Eugenol (allyl-3,4- dimethoxybenzene):** Vizubon D and Flykil 95 EC: This technique has been widely used by farmers, however, the effectiveness has decreased. Sometimes it harms crops since the trap can kill males but then more females accompany males and cause more damage to fruits. Now we advise farmers to not use it alone but to combine it with protein bait on large scale farm.
- **Protein bait (SOFRI Protein 10 DD) use:** With the help of an expert from Griffith University, SOFRI has developed a protein bait from beer waste, named SOFRI Protein 10 DD. Now it has been widely used in south Vietnam, especially in large scale monocultural farm of fruits and vegetable crops.
- **Cleaning of the falling fruits:** This technique is a MUST in the fruit fly control strategy, all the falling fruits should be collected and buried deep under soil. However, the farmers are still not keen to do this job on their orchards since it is labor intensive.

2.3 Project implementation sites

Based on the available information on crop acreage, purpose of crop growing, presence and absence of fruit fly species, reach of IPM programme (availability of experienced IPM trainers), estimated losses due to fruit fly species (as there is no information or field data on losses available) GIS assisted maps were prepared (see http://ipm.ait.asia/?page_id=399). Further putting other criteria like frequent backstopping support, ease of transportation etc. two provinces namely Long An and Tien Giang were selected as sites for project implementation, the first with Dragon fruit and the last with bittergourd (see fig. 1).

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3 National IPM Farmer Education

In the Mekong Delta region in Vietnam, many TOT courses on IPM have been conducted training staff from provincial Plant Protection Sub Departments IPM on paddy rice, fruit trees such as citrus under CARD-Australia, FAO, ect. In addition, the farmer field schools have also been conducted in different provinces such as Tien Giang, Ben Tre, Dong Thap, Can Tho, etc. However, the IPM programme has not been implemented for fruit fly management although a lot of work has been done on fruit fly. More on Vietnam IPM programme can be seen at <http://www.vegetableipmasia.org/Countries/vietnam.htm>

4 Fruit Fly IPM Project Intervention Design

In view of the information provided above, this project will prioritize following key activities:

- Identification of areas with occurrence of fruit flies and melon flies for GIS map development;
- Assembly of IPM package including various techniques: trapping, sanitation, protein bait, bagging, etc;
- Development of training curricula for the IPM trainers and their capacity building through intensive training of trainers;
- Farmers' training on fruit fly IPM using FFS;
- Development of extension brochures, participation in regional FF IPM efforts etc.

4.1 Overall Development Objectives

To enable smallholder growers to grow profitable, healthy and safe fruit and vegetable crops through enhanced knowledge and skills on fruit fly diagnosis, ecology and management.

4.2 Specific Objectives

The specific objectives are:

1. To trap and assess the current status of fruit fly occurrence and severity loss to develop GIS assisted maps of the fruit fly infected areas leading to the selection of project implementing sites and compilation of basic crop management practices;
2. To test, adapt, integrate and assemble effective fruit fly IPM strategies for area-wide control of fruit flies in selected crops and pilot areas in Long An and Tien Giang province in Vietnam;
3. To educate technical staff using TOT for FF IPM strategy and farmers using Farmer's Field School (FFS) on locally adapted fruit fly IPM ;
4. To develop training and extension materials on FF management.

4.3 Expected Outputs and Indicative Activities

No.	Objectives	Outputs	Indicative Activities	Remarks
1	To conduct baseline survey and assess the current status of fruit fly occurrences and severity losses as to develop GIS assisted maps of the fruit fly infected areas leading to selection of project implementing sites, and compilation of basic crop management practices	1.1 Country Strategy Paper developed;	Country Strategy Paper development and Planning for the project	
		1.2 Crop calendar available	Crop calendar developed	
		1.3. Site, and farmers selected , GIS map available	Data collection	
		1.4 Baseline analysis available	Baseline survey format developed, survey on the current status of fruit fly occurrence, host-range carried out	
2	To test, adapt and assemble effective fruit fly IPM strategies for area-wide control of fruit flies in pilot areas in Longan and Tiengiang provinces in Vietnam;	2.1. FFS curricula developed 2.2. Extension brochures for farmers available in Vietnamese	Participatory Action Research to develop locally suitable IPM package: Trial design developed and experiment set up, data collection, analysis and interpretation Extension brochures development and distribution	
3	To educate technical staff using TOT for FF IPM strategy and farmers using Farmer's	3.1 Session guides/ curricula available for a) training technical	A 7 days TOT on Fruit fly IPM for extension workers carried out	

	Field School (FFS) on locally adapted fruit fly IPM ;	staff and for b) training farmers	(Session guides/ curricula developed and adapted)	
		3.2 FFS diary developed and field days / trainings carried out for technical staff, farmers and Plant protection officers	Setting up FFS: Organizing Farmer's field day to inform other farmers in the locality Participatory training carried out, including information collection from farmers lead to the assembling of locally suitable IPM package including translated extension material	

5 Results Utilization Plan

Once the project is completed, the key outputs e.g. GIS mapping, data on current status of fruit fly occurrences, host-range and crop losses, FFS curricula, session guides, and adapted fruit fly IPM management strategies will be used for future farmer training and awareness raising. Training materials and case studies on impact of training and successful area-wide management of fruit flies will be documented and made electronically available and posted on website(s) for use by the Vietnamese Government and other development partners.

Annexes:

Annex 1: LOGICAL FRAMEWORK FOR FRUIT FLY IPM PROGRAMME IN VIETNAM

<i>Objectives</i>	<i>Intervention logic</i>	<i>Objectively verifiable Indicators of achievement</i>	<i>Sources and means of verification</i>	<i>Assumptions</i>
Overall objectives	To enhance knowledge on fruit fly ecology and integrated pest management among smallholder farmers to be able to grow healthy and safe fruit and vegetable crops by sustainable practice of IPM and reduced use of high toxic chemical pesticides leading to food safety and food security, and improved income in the project areas (Some selected districts of Long An and Tien Giang Province, Vietnam)	<p>a) Current status of FF in Vietnam known and validated by respective available GIS maps of worst affected Fruit fly and Melon fly areas in 13 provinces in Mekong Delta region;</p> <p>b) locally adapted IPM package for FF in 2 provinces available;</p> <p>c) Two field studies on FF management practices; Two FFS (2FFS/year and repeated) , 100 farmers trained, at least 40 % of these being female;</p> <p>f) Govt. and Plant Protection officials exposed to FF; and</p> <p>g) Gender aware FFS training curricula developed and translated into Vietnamese.</p>	<p>a) Three-monthly and half yearly reporting by Vietnam to AIT;</p> <p>b) Six-monthly report; and</p> <p>c) Final report.</p>	<p>a) Smallholder fruit and vegetable farmers remain interested and fruit fly continue to occur as pest for fruits and vegetables;</p> <p>b) Continued support from the donors.</p>
Specific objectives	1. To assess the current status of fruit fly occurrences, severity losses, past	Country logframes and work plans available, baseline survey data validate	Initial Country report, Country strategy paper, log-	-Availability of in-depth quantitative and qualitative information

	<p>management efforts.</p> <p>2. To develop GIS assisted map of the fruit fly infected areas leading to selection of project implementing sites and compilation of basic crop management practices;</p> <p>3. To adapt, assemble and translate into Vietnamese local fruit fly IPM strategies for Mekong Delta, Vietnam.</p> <p>4. Capacity building of IPM trainers;</p> <p>5. To educate farmers using IPM FFS approach;</p>	<p>previous assumptions; crop calendars available</p> <p>GIS map for the Mekong Delta, Vietnam showing fruit fly vulnerable area available</p> <p>Translated (into Vietnamese) training and extension materials on FF management available</p> <p>Curricula for TOT and FFS available including data from field studies</p> <p>100 of male and female farmers trained during FFS in the pilot provinces</p>	<p>frame, workplan, baseline data and crop calendars</p> <p>GIS assisted fruit fly maps for the Mekong Delta, Vietnam</p> <p>Summary field study report, curricula for the TOT and FFS for the selected crops; Extension brochures on key learning ; FFS reports and diary</p>	<p>-Availability of quantitative and detailed information on seasonality, occurrence, host-range and other needed information; Occurrence of fruit fly and melon fly continues; interest of the trainers and farmers in the programme;</p> <p>Successful adaptation of IPM package and its integration into farmers' practices is wanted by farmers.</p>
Expected results	<p>1. Status of the FF management in Long An and Tien Giang provinces identified;</p> <p>2. GIS map on occurrences of Fruit flies</p>	<p>Active participation in the planning process at national and regional level;</p>	<p>Country report, presentation, country strategy paper and log frames</p>	<p>-Interest of the Plant Protection Officials, farmers and trainers in the programme;</p> <p>-Availability of in-dept quantitative and quality information;</p>

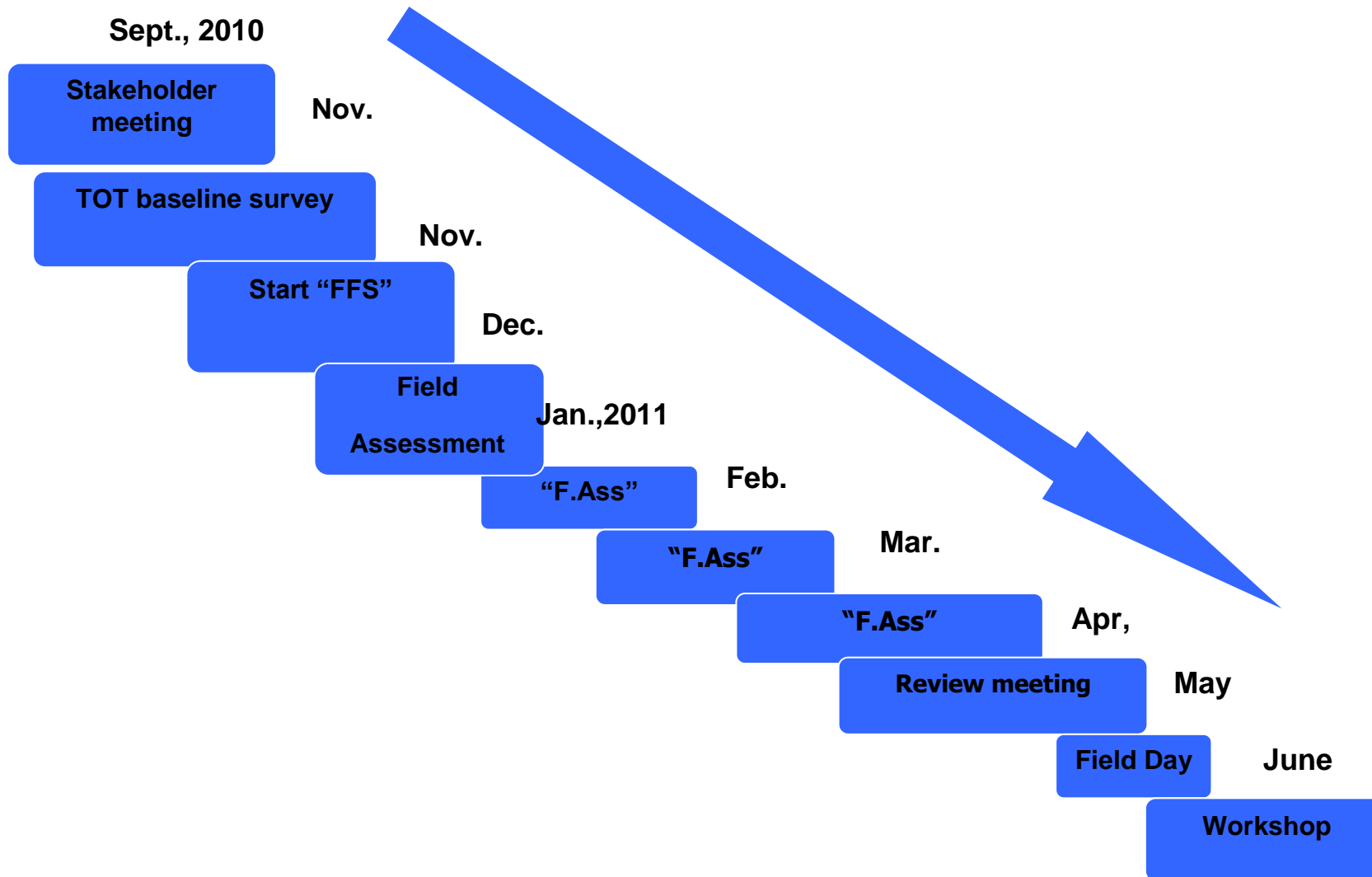
	<p>on some fruit and vegetable crops, areas and seasons developed for Mekong Delta, Vietnam;</p> <p>3. Monitoring and implementation on fruit fly management strategies is known by IPM trainers and passed on to farmers during FFS;</p> <p>;</p> <p>4. Availability of training and extension materials on the FF IPM.</p>	<p>GIS map for planning of project implementation areas;</p> <p>Number of PAR conducted at selected sites and 30 IPM trainers trained in intensive TOT</p> <p>IPM FFS training curriculum for fruit fly and melon fly developed; Four pilot FFS for training of 100 farmers in 2 provinces carried out applying FF IPM</p> <p>Some locally tested training materials and extension brochures on FF IPM are available and distributed.</p>	<p>GIS maps available for the Mekong Delta, Vietnam</p> <p>Summary report of the PAR, Curricula, FFS and monitoring and evaluation plans</p> <p>FFS report and diary including information on list of farmers exposed</p> <p>Extension brochures</p>	<p>-Occurrences of fruit fly and melon fly; interest of the trainers and farmers in the programme;</p> <p>-Occurrences of fruit fly and melon fly; interest of the trainers and farmers in the programme;</p> <p>-Achievement of successes in managing FFS and interest of local communities in having more information.</p>
<p>Activities</p>	<p>The key activities to be carried out are:</p> <ol style="list-style-type: none"> 1. Baseline surveys on the current status of fruit fly occurrences, host-range, and develop GIS map; 2. Project planning workshop; 3. Participatory Action Research on Fruit fly management (PAR); 4. Intensive TOT on IPM Fruit fly 	<p>The means required for implement these activities are:</p> <p>Personnel, equipment, training, studies, operational facilities, supplies etc.</p>		<p>- Requirements for starting up activities are met</p>

	management;				
	5. Fruit fly IPM Farmer Field Schools.				
Specific Objective1	Act.1: Current status of fruit fly, crop hosts, losses, seasonality and past pest management practices and future possibilities Act.2: Detailed implementation plan, collaborative mechanism, backstopping needs and other details developed	Regional Workshop Project planning and implementation meeting organized	Report Report	-Interest of the Plant Protection Officials, farmers and trainers in the programme.	
Specific Objective2	Act.1: Identification of key fruit fly endemic areas	GIS map for fruit fly available	Report with Regional and national GIS maps	-Availability of the quantitative information pertaining to the crop, season, occurrences etc. on fruit fly	
	Act.2: Site selection for the project implementation	Sites for setting up adaptive research and TOTs selected	Report	-Interest of the country and Government support to the project	
	Act.3: Current status of the crop management practices in relation to the fruit fly occurrences, seasonality, losses, farmer knowledge etc.	Baseline survey report submitted and compiled by AIT with a summary section, indigenous ideas on management identified, regional report (on Vietnam and other countries) baseline report compiled by AIT	Baseline survey report	-Interest of the country and Government support to the project	

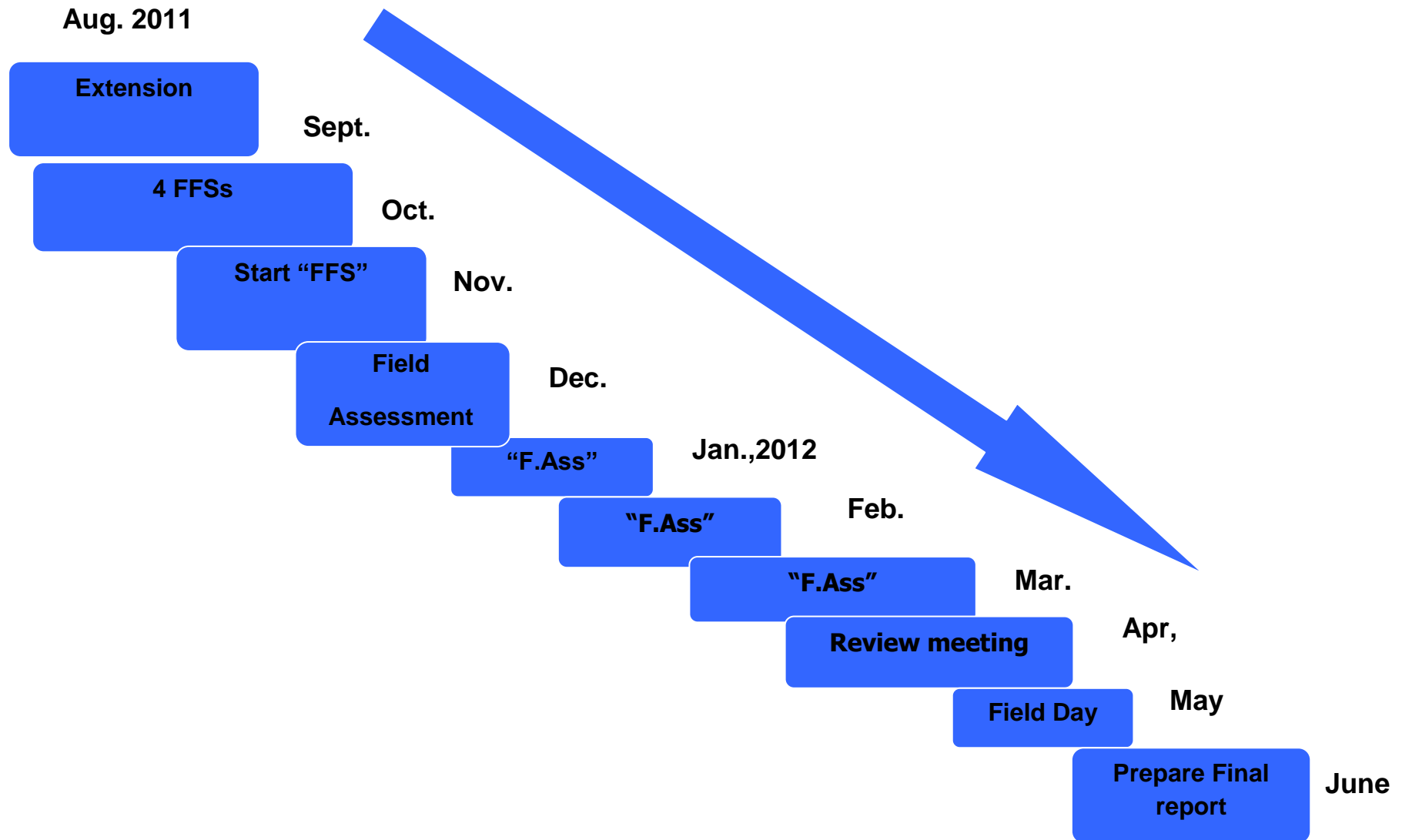
Specific Objective 3	Act.1: Monitoring of FF population using AESA method for fruit fly IPM FFS	700 farmers trained, 35 % female farmers; 25 Vietnamese IPM trainers (30 % female) trained in AESA application	FFS report	-Occurrences of the fruit fly and interest of the farmers and trainers
	Act.2: Adaptive research for assembling locally suitable IPM package	Adaptive research carried out in Vietnam to validate and assemble IPM package	Report	-Occurrences of the fruit fly and interest of the farmers and trainers
	Act. 3. Training of trainers course	25 Vietnamese trainers have been trained, 30 % female	ToT report	Occurrences of fruit flies, availability of the proven and working options for fruit fly IPM and interest of farmers and IPM trainers
Sp. Objective 4	Act.1.Six (6) FFS will be conducted and total 6x25 = 150 farmers will be trained in FF IPM in the Mekong Delta, Vietnam	<i>150 farmers trained during 6 FFS in Vietnam</i>	FFS Report and diary for each year	Occurrences of the fruit flies and interest of the farmers and trainers
	Act.2. Exposure of additional farmers through field-days (4 field days) Act. 3 Exposure of Plant Protection officials through field visits / training	400 additional farmers exposed through awareness raising activities (e.g. 4 field days) 30 Plant protection officials will be exposed to project activities and FF IPM methods	FFS report and diary Field visit report	Interest of other farmers from the communities to learn about FF IPM
Sp. Objective 5	Act.2. Production of extension brochures which will be distributed to farmers	(500 copies) bi-lingual (Vietnamese and English) distributed	Brochures	Need to extend FF IPM among others in the society

Act.3. Participation and hosting country fruit Fly IPM Network	A network of farmers, extension research workers and farmers developed and linked	List of participating persons, address details – part of final report	The plant protection communities remain interested in fruit fly IPM issues
Act 1: Planning for adaptive research set up and FFS	Workshop carried out	Workshop Report	

Annex 2: Work plan and timetable



First six months (dry season) timeline



The end of first year and second year timeline

Annex 3: Budget plan

SI	Activities	When (Timeframe)	Where	Who	How	Estimated Budgets (USD)
1	Inception Workshop	Sep 1-3, 2010	Thailand	Chien, Hoa		
2	Work plan	Sep. 3, 2010	Thailand	Chien, Hoa		
3	Resource person Meeting	Nov., 2010	Vietnam	Mr. Chien, Dr. Hoa Dr. T.V. Hai Mr. L.Q Dien	Help in teaching and preparing of the documents	3.000
4	TOT opening	Nov., 2010	SOFRI and Field	Chien, Hoa, Dien (30 persons from PPSDs)	laboratory and field observation	
5	Farmer selection (demo. sites)	Nov., 2010	Tien Giang, Long An	Chien, Hoa, etc.	Prepared criteria Work with local authority	5.000
6	FSS Opening and farmer training	Nov., 2010 – Mar, 2011	Tien Giang, Long An	Chien, Hoa and TOT	Get approval by provincial officers	
7	Field survey (FFS)	Nov., 2010 – Mar, 2011	Tien Giang, Long An	Farmers and TOT	Prepare the sheet for farmer to collect data	

8	Demo. site set up (community level)	Nov, 2010	Tien Giang, Long An	Chien, Hoa, TOT and farmers	All IPM approaches applied	
9	IPM approaching	Nov, 2010 – Mar, 2011	Tien Giang, Long An	Chien, Hoa, TOT and farmers	All IPM approaches applied	
10	Documents and Materials (Leaflet, Poster, etc)	Nov – Dec., 2010	Tien Giang	Chien, Hoa, Dien	Write, translate and publish	2.000
11	Data survey mapping	Nov., 2010 – Sep., 2012	13 provinces	Chien, Hoa, etc.	Accomplish data collection forms	2.000
12	Cross site visits	Mar. 2011	Tien Giang, Long An	Chien, Hoa, TOT and farmers	Take farmers and TOT to different sites for visit	
13	Pre-Post "KAP" survey	Nov, 2010 & Sep, 2012	Tiengiang, Longan	Chien, Hoa, TOT, etc.	Investigate the knowledge of farmers before and after the project	
14	FFS (second year)	May, 2011	2 provinces	Chien, Hoa, TOT and farmers		5.000
15	New cropping season	May, 2011	2 provinces	Chien, Hoa, TOT and farmers	Extend to other provinces	
16	Review workshop	Sep, 2012	Decide later	Chien, Hoa	Review project achievement	1.000

17	Local Traveling	2010 – 2012	2 provinces		2.000
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Note: - Fund from the project: 15.000 USD
- Country contribution (Matching): 5.000 USD
- Total: 20.000 USD