Asia-Pacific
Economic Cooperation

Capacity Building in Surveillance and Diagnosis for Leafminer, Whitefly, Thrips and Mealybug Pests in Developing APEC Economies for Improved Market Access

APEC Agricultural Technical Cooperation Working Group

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ATC 01/2007A

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TABLE OF CONTENTS

1. BACKGROUND INFORMATION

Leafminers, whiteflies, thrips and mealybugs are serious and widespread agricultural pest problems in the region, becoming increasingly more important over the last five years. Leafminers attack numerous vegetable crops and are particularly important pests for beans (especially long bean), cucumber (also some other cucurbits), potato, tomato and crucifers (e.g. cabbage). It has been reported that whitefly (*Bemicia tabaci*) damage and virus disease transmission on vegetables have increased significantly in the last five years. Whitefly problems on fruit trees have also been reported. Thrips are now common throughout the tropical areas of Southeast Asia, and are also found in other parts of the world. Thrips species infesting agricultural crops pose difficult problems to developing economies in terms of market access. Mealybugs can cause severe damage to agricultural crops. For example, the pink hibiscus mealybug can infest, reproduce, and cause severe damage on over 200 genera in 70 different families of plants, including cotton, citrus, many vegetables, grapes, ornamentals, and other species of major importance to agriculture in many APEC economies. It has been estimated that the mealybug's potential cost to U.S. agriculture is US$750 million per annum.

APEC economies are, to a certain extent, aware of the importance of these pests. For example, many species of leafminers, whiteflies, thrips and mealybugs appear on the Northern Australian Quarantine Strategy (NAQS) priority list.

However, for developing economies in-country expertise and information is largely lacking. This deficiency of knowledge has serious implications to both national plant protection and plant quarantine management. In particular, it would not be possible to know which species to exclude upon plant quarantine inspection, and there would be no in-country expertise to identify these pests on plant imports.

2. PROJECT STRUCTURE

The APEC Project on "Capacity Building in Surveillance & Diagnosis for Leafminer, Whitefly, Thrips & Mealybug Pests in Developing APEC Economies for Improved Market Access" was conceived as a two-year project (ATC 01/2006A & ATC 01/2007A).

The Project objectives were to:

- Create awareness in developing APEC economies to the problems caused by leafminer, whitefly, thrips and mealybug pests as constraints to productivity and trade, and the need to generate adequate plant health information necessary under the new global trading environment to help improve rural livelihoods and reduce poverty of farmers through higher quality produce and better market access.
- Improve skills among national plant protection and quarantine officers to detect the presence and extent of these pests in their country and to reduce the economic impacts caused by the outbreak of such pests,
- Build capacity of and cooperation between member economies to implement pest surveillance programs for building information on the health status of vegetable and ornamental industries, particularly with respect to these pests, to maintain and secure market access. The commonality of interest in these pests practically paves the way for greater economic and technical cooperation, a major APEC MAPA objective.

The project ATC 01/2006A consisted of:

- Phase I: Planning Workshop to develop common surveillance protocols.
- Phase II: In-country surveillance and collection.

The Year-2 Project (ACT01/2007A) addressed the identification of specimens collected from participating economies during their surveys through the following reentry workshops:

- APEC Reentry Workshop on Leafminers and Thrips (Universiti Putra Malaysia, Serdang, Malaysia, 26th February to 8th March 2007)
- APEC Reentry Workshop on Whiteflies and Mealybugs (Universiti Malaya, Kuala Lumpur, Malaysia, 16-26 April 2007)

3. APEC REENTRY WORKSHOP ON LEAFMINERS AND THRIPS

The first Reentry Workshop was organised at the Faculty of Forestry, Universiti Putra Malaysia (UPM), Serdang, Malaysia from 26th February to 8th March 2007 and was attended by 16 participants from 8 member economies and 2 resource persons. Eleven observers from different institutions in Malaysia also participated in the workshop (**Attachment A**). The programme of the workshop is given as **Attachment B**.

Two resource persons from Australia were invited to deliver the lectures during the 10 days workshop (5 days for each resource person).

- Dr. Mallik Malipatil, Principal Systematic Entomologist, Department of Primary Industries – Knoxfield, PMB 15, Ferntree Gully Delivery Centre, Victoria 3156, Australia for the following topics on leafminers:
  a. Economic importance of leafminers
  b. Introduction to leafminer taxonomy
  c. Preparation methods of leafminer specimens
  d. Dissection of leafminer genitalia
  e. Identification of leafminers (morphology and terminology, use of CSIRO fly CD, LUCID keys and practicals)
  f. Identification of leafminer parasitoids
  g. Leafminer resources on the web
  h. Importance of specimens and collections
  i. Diagnostic protocols
  j. Preparation and identification of collected specimens (2 days)

- Dr. Laurence A. Mound, CSIRO Entomology, P.O. Box 1700, Canberra, ACT 2601 Australia for the following topics on thrips:
  a. Economic importance of thrips
  b. Introduction to thrips taxonomy
  c. Thysanoptera slide mounting methods
  d. Taxonomic tools for thrips
  e. Identification of thrips (morphology and terminology, use of LUCID keys and practicals)
  f. Thrip resources on the web
  g. Importance of specimens and collections
  h. Data recording and slide labelling
  i. Preparation and identification of collected specimens (2 days)

All participants were supplied with two CD-ROMs to take home, one of which includes an information and identification system for the nine families of thrips worldwide, together with 180 species that are of some economic interest. The second CD deals with the 99 major pest species in the family Thripidae, and in addition includes an identification method using molecular data. Each of these CD-ROMs contains 1500 colour photomicrographs of slide-mounted thrips, illustrating details of structures to be observed, and thus effectively giving the user access to an extensive museum reference collection of identified thrips species. Using these CD-ROMs, each participant can not only progressively expand their own identification expertise, but can also provide instruction on basic methods to others. In addition all participants were also given reference materials on leafminers of Southeast Asia.

During the discussions and evaluation on the benefit of the workshop to them and their respective country the following observations and issues emerged:

- Some of the participants are now more confident in the identification of major important thrips and leafminers.
- National pest list specifically on thrips and leafminers could be initiated in some of the participating economies.
- The ability of most participants to recognise and identify thrips and leafminers are improved.
- Networking between participants of the different economies and the experts established.

From the post-workshop evaluation all participants stated that they gained a lot from the workshop especially they are now have confidence in identifying thrips and leafminers up to species level. The knowledge received from the workshop is also very valuable for them to conduct monitoring and surveillance of these two groups of pests in other important crops in their economies. Seventy percent of the participants rated the overall value of the 1st reentry workshop and its effectiveness as good (5)

4. APEC REENTRY WORKSHOP ON WHITEFLIES AND MEALYBUGS

The second Reentry Workshop was organised at the Institute of Biological Sciences, Universiti Malaya (UM), Kuala Lumpur, Malaysia from 16 to 26 April 2007 and was attended by 17 participants from 7 member and 2 non-member economies. Six observers from different institutions in Malaysia also participated in the workshop (**Attachment C**). The programme of the workshop is given as **Attachment D**.

Three resource persons, one each from Malaysia, USA and Indonesia were invited to give lectures in the workshop.

- Dr. Gillian A. Watson, Senior Insect Biosystematist, Plant Pest Diagnostic Center, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, CA 95832-1448, USA for the following topics:
  a. Economic importance of mealybugs and whiteflies
  b. Hemipteran classification
  c. Distribution and quarantine issues
  d. Collection and preservation
  e. Principles of slide making
  f. Data capture and labelling specimens
  g. Use of dissection microscopes

h. Introduction to whiteflies
i. Whiteflies look-alike
j. Morphology of whiteflies
k. Use of internet sources for identification
l. Identification of field collected specimens
m. Introduction to mealybugs
n. Tips for slide-mounting of mealybugs
o. Mealybug look-alikes
p. Morphology and carácter recognition
q. Online resources on mealybugs
r. Identification of field collected mealybugs
s. Identification of field collected mealybugs and whiteflies (3 days)

- Dr. Ho Cheng Tuck, CABI Associate, CAB International – SEARC, Glasshouse Complex, MARDI HQ, 43400 Serdang, Selangor, Malaysia for "Control and Management of Whiteflies and Mealybugs"
- Ms. Dewi Sartiami, Lecturer, Insect Taxonomy Laboratory, Department of Plant Protection, Bogor Agricultural University, IPB Kampus Darmaga, Jln. Kamper, Bogor 16680, Indonesia to assist Dr. Watson in all laboratory practicals and identification.

All participants were supplied with two CDs, one on "Identification of mealybugs (Hemiptera: Pseudococcidae) and The second CD deals with "Identification of whiteflies (Hemiptera: Aleyrodidade). Using these CDs, each participant can not only progressively expand their own identification expertise, but can also provide instruction on basic methods to others. In addition all participants were also given reference materials on white flies and mealybugs of Southeast Asia.

From the post-workshop evaluation, all participants indicated that they gained a lot from the workshop, particularly in terms of increased confidence in identifying mealybugs and whiteflies up to species level. The knowledge gained from the workshop also provide very valuable skills training to make slides and identify of these two groups of pests up to species level in other important crops in their economies. Ninety six percent of the participants rated the overall value of the 2nd reentry workshop and its effectiveness as good (4-5)

During the discussions on the benefit of the 2nd workshop to them and their respective country the following observations and issues emerged:

- National pest list specifically on whiteflies and mealybugs could be initiated in some of the participating economies.
- The ability of most participants to recognise and identify whiteflies and mealybugs are improved.
- Networking between participants of the different economies and the experts established.

5. IDENTIFICATION OF IN-COUNTRY COLLECTED SPECIMENS

Following the survey protocols developed in Phase I, each participating economy was partially supported by project funds to conduct a survey for the target pests. Participants were provided with some small equipment items and the project consultants made mentoring visits to each participating economy to assist in monitoring and advising on the implementation of the survey.

Mentoring visits were conducted by project consultants to participating economies to provide support in project activities, such as planning surveillance, selecting the target crops, collecting and preparing specimens for identification, etc.

Overall, the survey activities for these four groups of plant pests was well completed and there were no serious problems. Surveys for these pests were carried out and specimens collected from vegetables and citrus (Brunei), leafy and fruit vegetables (China), field crops (Chinese Taipei), mango (Indonesia), cut flowers, fruits and vegetables (Malaysia and The Philippines), cut flowers and vegetables (Singapore), basil leaves (Thailand) and chrysanthemum and citrus (Viet Nam). The collected specimens were identified during the reentry workshops of the Year-2 Project (ACT01/2007A). The identified specimens of leafminers, thrips, whiteflies and mealybugs from the different participating economies is given as **Attachment E**.

6. LESSON LEARNT FROM THE PROJECT

Useful lessons have been learnt for future activities

Synergistic cooperation between APEC economies, regular monitoring by the project overseer and steering committee of the project as well as the expertise and full commitment of the consultants were very important elements for the successful implementation of the project.

The support and co-operation of co-sponsoring APEC Economies, from concept planning to implementation, are important elements in ensuring that project objectives are fully met. Project objectives that are truly aligned with the needs of developing APEC economies assured good response and active participation.

Gender Considerations

The Project Overseer is a lady and the Steering & Organising Committees consisted of a significant number of women (five), equivalent to about 47%., two resource persons (out of 5 or 40%) are women and 27 participants of the two re-entry workshops were women (50 %).

Participation

The participants, resource persons and consultants of this project represented NPPOs, academia, agricultural research institutions and NGOs, covering a wide spectrum of stakeholders, with relevant knowledge and experience of surveillance issues and the species of the four targeted pests.

Financing

While careful budget planning assured the overall smooth implementation of the project, APEC rules on disbursement presented some difficulties for participants from some member economies who were unable to pay for their expenses ahead of re-imbursement after the workshop and other project activities. Although this was overcome through advancement of funds by the Consultants after securing approval from APEC Secretariat, it nevertheless represented an unexpected intervention. It is hoped that the APEC Secretariat can, in future, consider disbursement of per diem and traveling expenses for designated eligible participants to be managed by the appointed accordingly on behalf of APEC.

7. NEXT STEPS

All participants of the two reentry workshops agreed that the project has successfully achieved its objectives by creating awareness to the problems caused by the four selected pest groups: leafminers, whiteflies, thrips and mealybugs; improving their skills to detect the presence and extent of these pests in their economy; and building their capacity to implement pest surveillance programmes for building information on the health status of their vegetable and ornamental industries.

Implementation of this project provided an insight into appropriate approaches to plant health capacity-building for developing economies. Experience gained from this project suggest that capacity-building by example, drawing on real issues that confront developing economies represent perhaps the most fitting approach to knowledge and skills transfer; participants can perceive real gains right from the start.

All the Project outputs were fully achieved:

- A total of 54 participants from 9 APEC economies actively participated in these two re-entry workshops
- Relevant CD-ROMs, CDs and identification manuals were distributed to all participants
- Standard procedures for collection and preservation of the target pests were developed
- Workshop manuals, encompassing the biology and ecology, economic importance and identification keys of the target pests were produced and distributed
- Each participating economy has a comprehensive specimens collection of the target pests with correct identification.

As a whole, the project has made significant achievement and it has been very relevant for APEC economies to meet and share information on these pressing issues of pest collection and identification in relation to WTO SPS requirements and trade liberations.

The following APEC future activities have been strongly recommended by participants:

- Setting up a Regional Plant Pest Specimen Collection Centre for APEC member economies as an integral component of a network to enable an effective exchange of specimens and related information among APEC member economies for mutual benefit.

- Establishing a regional portal on specimen collection and databases of related information in support of animal and plant health as well as food safety,

- Establishing a regional diagnostic network for APEC member economies to:
  a) provide plant pests and diseases diagnostic services for specimens that cannot be conclusively identified in-country due to lack of adequate capacity and information.
  b) make full use of existing regional expertise where available, maximizing the use of these scattered regional skills and in furtherance of the goal of self-reliance in taxonomy among countries in the region.

Attachment A

APEC RE-ENTRY WORKSHOP ON LEAFMINERS AND THRIPS
26th February to 8th March 2007
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Attachment B

APEC Re-entry Workshop on Thrips and Leafminer Flies

Universiti Putra Malaysia
Serdang, Selangor, Malaysia
26th February to 8th March 2007

Workshop Program

DAY 1 Monday 26th February 2007

Time	SESSION 1- OPENING AND INTRODUCTION
8: 30 - 9:00	**Registration**
9:00 - 9:20	**Welcome Remarks and Opening**
9:00 -10:00	**Presentation: Workshop context and introduction** **Presentation: Economic Importance of Thrips**
10:00 - 10:30	BREAK - morning tea
10:30 - 12:30	**SESSION 2 – THRIP TAXONOMY INTRODUCTION**
10:30 - 12:30	Structure of the 5 days Biology, ecology and economic importance Morphological characteristics and diversity Introduction to collecting thrips in field
12:30 - 1:30	BREAK – Lunch
1:30 - 3:00	**SESSION 3 – THYSANOPTERA SLIDE MOUNTING METHODS**
1:30 - 3:00	Demonstration: Slide mounting methods
3:00 - 3:30	BREAK – afternoon tea
3:30 - 5:00	**SESSION 4 – THYSANOPTERA SLIDE MOUNTING METHODS** Demonstration: Slide mounting methods (continued)
5:00	**Close for Day 1**

DAY 2 Tuesday 27th February 2007

8:30 - 10:00	**SESSION 5 – THYSANOPTERA SLIDE MOUNTING METHODS** Demonstration: Slide mounting methods (continued)
10:00 - 10:30	BREAK – morning tea
10:30 - 12:30	**SESSION 6 – TAXONOMIC TOOLS FOR THRIPS** **Morphology and Terminology**

	Use of CSIRO Thrips CD Keys – Lucid, paper keys
12:30 - 1:30	BREAK – lunch
1:30 - 2:30	**SESSION 7 – TAXONOMIC TOOLS FOR THRIPS** **Use of keys – CD and paper keys continued**
2:30 -3:00	BREAK – afternoon tea
3:00 -4:30	**SESSION 8 – IDENTIFICATION OF THRIPS** Use of keys – CD and paper keys continued
4:30 - 5:00	Use of keys – CD and paper keys continued and Close for Day 2

Day 3 Wednesday 28th February 2007……..

Time	**SESSION 9 – IDENTIFICATION OF THRIPS**
8:30 – 12:00	Preparation and identification of field collected specimens
12:00 - 1.00	BREAK - lunch
1.00 – 3.00	Identification of field collected specimens
3:00 – 3:30 3:30 – 5:00 .	Preparation and identification of field material Continued and Close for Day 3

Day 4 Thursday 1st March 2007……

8.30 -10:30	**SESSION 10 - IDENTIFICATION OF THRIPS**
10:30 - 11:00	BREAK – Morning tea
11:00 - 12:30	**SESSION 11 - IDENTIFICATION OF THRIPS**
12:30- 1:30	BREAK – lunch
1:30 - 3:00	**SESSION 12 - Thrips resources on web- Internet access to Thrips database**
3:00- 3:30	BREAK – afternoon tea
3:30 - 5:00 5.00	**SESSION 13 - Thrips resources on web -Internet access to Thrips database** **Close for Day 4**

Day 5 Friday 2nd March 2007- Free

DAY 6 Saturday 3rd March 2007

8: 45- 10:00	**SESSION 14 - Importance of specimens and collections**
10:00- 10:30	BREAK – morning tea
10:30- 11:30	**SESSION 15 – Data recording and Slide labelling**
11:30- 12:30	**Data recording and Slide labelling (continued)**
12:30- 1:30	LUNCH
1:30- 3:30	**SESSION 16 – GENERAL DISCUSSION**
3:30- 4:00	BREAK- afternoon tea
4.00- 5.00	**SESSION 17- Appraisal**
5.00	**Close for Day 6**

DAY 7 Sunday 4th March 2007 -

Time	**SESSION 1- OPENING AND INTRODUCTION**
9:00 - 9:20	**Welcome Remarks:**
9:20 -10:00	**Presentation: Workshop context and introduction** **Presentation: Economic Importance of Leafminers**
10:00 - 10:30	BREAK - morning tea
10:30 - 12:30	**SESSION 2 – LEAFMINER TAXONOMY INTRODUCTION**
10:30 - 12:30 12:30 - 1:30	Structure of the 5 days Biology, ecology and economic importance Introduction to collecting leafminers in field BREAK – Lunch
1:30 - 3:00	**SESSION 3 – LEAFMINER SPECIMEN PREPARATION METHODS**
1:30 - 3:00 3:00 - 3:30	Demonstration: specimen preparation BREAK – afternoon tea
3:30 - 5:00	**SESSION 4 – LEAFMINER GENITALIA DISSECTION** **Demonstration: specimen preparation**
5:00	**Close for Day 7**

DAY 8 Monday 5th March 2007

8:30 - 10:00	**SESSION 5 – LEAFMINER GENITALIA DISSECTIONS** **Hands-on work:**
10:00 - 10:30	BREAK – morning tea
10:30 - 12:00	**SESSION 6 – IDENTIFICATION OF LEAFMINERS** **Morphology and Terminology** ***Use of CSIRO fly CD*** ***Keys – Lucid, paper keys***
12:00 - 1:00	BREAK – lunch
1:00 - 2:30	**SESSION 7 – IDENTIFICATION OF LEAFMINERS** **Use of keys – CD and paper keys continued**
2:30 -3:00	BREAK – afternoon tea
3:00 -4:30	**SESSION 8 – IDENTIFICATION OF LEAFMINER PARASITOIDS** **Use of keys – CD and paper keys continued**
4:30 - 5:00	Preparation for field trip on Wednesday and Close for Day 8

DAY 9 Tuesday 6th March 2007

Time	**FIELD TRIP**
8:30 – 12:00 12:00 - 1.00	Field collecting and observations BREAK - lunch
1:00 - 3:00 3:00 – 3:30 3:30 – 5:00 . 5.00	Return to laboratory and prepare specimens Preparation and identification of field material Continued Close for Day 9

Day 10 Wednesday 7 March 2007

8.30 -10:30	**SESSION 9 - Leafminer resources on web** **Dampewolf website** **Joshi's website** **Parella's - biology of leafminers** **EU diagnostic protocols**
10:30 - 11:00	BREAK – Morning tea
11:00 - 12:30	**SESSION 10 - Preparation and identification of field material**
12:30- 1:30	BREAK – lunch

1:30 - 3:00	**SESSION 11 - Major leafminer parasitoids**
3:00- 3:30	BREAK – afternoon tea
3:30 - 5:00	**SESSION 12 - Major leafminer parasitoids**
5.00	**Close for Day 10**

Day 11 Thursday 8 March 2007……

8: 45- 10:00	**SESSION 13 - Importance of specimens and collections** **APPD web searches, data entry** **? Pest lists derived from workshop identifications**
10:00- 10:30	BREAK – morning tea
10:30- 11:30	**SESSION 14- CABI Crop Protection Compendium** **Use for data on pest biology, distribution, images and risk analysis**
11:30- 12:30	**SESSION 15 - Diagnostic protocols**
12:30- 1:30	BREAK – lunch
1:30-3:30	**SESSION 16 - Preparation of leafminer training plans for colleagues and staff**
2:30- 3:00	**SESSION 17 - Preparation of leafminer training plans for colleagues and staff**
3:30- 4:00	BREAK- afternoon tea
3.30- 4.45	**SESSION 18- Appraisal**
4.45-5.00	**Close for Day 11**

Day 12 Friday 9 March 2007- Departure of Participants

APEC 2nd RE-ENTRY WORKSHOP ON WHITEFLIES AND MEALYBUGS
16th to 26th April 2007
Universiti Malaya, Kuala Lumpur, Malaysia

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Attachment D

APEC Re-entry Workshop on Whiteflies and Mealybugs

Institute of Biological Sciences, Universiti Malaya
Kuala Lumpur, Malaysia
16th to 26th April 2007

Workshop Program

Sunday 15th April 2007 - Arrival of participants
PM - Setting up the laboratory and equipment (GW, SS, Chan & Hanifah)

Monday 16th April 2007

Time	SESSION 1- OPENING AND INTRODUCTION
08: 30 - 09:00	**Registration**
09:00 - 09:30	**Welcome Remarks and Opening**
09:30 - 10:00	**Self Introduction**
10:00 - 10:30	BREAK - morning tea
10.30 - 11.15	**Initial evaluation questionnaire**
	SESSION 2 – ECONOMIC IMPORTANCE AND ISSUES
11.15 - 11.25	**Hemipteran classification**
11:25 – 11:55	**Economic importance of mealybugs and whiteflies**
11:55 – 12:10	**Distribution and quarantine issues**
12.10 - 12.30	**Discussion and questions**
12:30 – 14:00	LUNCH
	SESSION 3 – INTRODUCTION TO WHITEFLIES
14:00 – 14:20	**Collection and preservation**
14:20 – 15:00	**Principles of slide making**
15:00 – 15:30	**BREAK – Afternoon tea**
15.30 – 15.40	**Data capture and labelling specimens**
15:40 – 16:00	**Slide storage and packing**
16:00 – 16:20	**Use of dissection microscopes**
16.20 – 16.35	**Beginning of slide preparation**

16.35 - 17.00	**Question session**
	Close of Day 1

Tuesday 17th April 2007

Time	SESSION 4 – IDENTIFICATION OF WHITEFLIES
08:30 – 09.15	**Introduction to whiteflies**
09.15 – 09.20	**Whitefly look-alikes**
09.20 – 09.30	**Tips for slide-mounting whitefly 'puparia'**
09.30 – 10.00	**Preparation of temporary mounts of whitefly 'puparia'**
10:00 – 10:30	**BREAK** – Morning tea
10.30 – 10.45	**Questions on slide-making problems encountered**
10.45 – 11.10	**Use of compound microscopes**
11:10 – 12:30	**Morphology of whiteflies**
12:30 – 13:45	**BREAK - Lunch**
13:45 – 14:00	**Use of keys**
14.00 – 15.00	**Group identification of whitefly 'puparia'**
15:00 – 15.30	**BREAK – Afternoon tea**
15.30 – 16.45	**Identification of field-collected whiteflies**
16.45 – 17.00	**Question session**
	Close of Day 2

Wednesday 18th April 2007

Time	SESSION 5 – IDENTIFICATION OF WHITEFLIES
08:30 – 08.45	**Use of Internet resources for identification of whiteflies**
08.45 – 09:30	**Group identifications using the Internet**
09.30 – 10.00	**Field identification and writing your own keys**
10:00 – 10:30	**BREAK – Morning tea**
10:30 – 10:45	**Demonstration of specific morphological characters**
10.45 – 12.30	**Identification of field-collected whiteflies**
12:30 – 13:30	**BREAK - Lunch**
13:30 – 15:00	**Identification of field-collected whiteflies (continued)**
15:00 – 15:30	**BREAK – Afternoon tea**

15.30 – 16.45	**Identification of field-collected whiteflies (continued)**
16.45 – 17:00	**Question session**
	Close of Day 3

Thursday 19th April 2007

Time	SESSION 6 – IDENTIFICATION OF WHITEFLIES
08:30 – 10:00	**Identification of field-collected whiteflies (continued)**
10:00 – 10:30	**BREAK – Morning tea**
10:30 – 12.30	**Identification of field-collected whiteflies (continued)**
12:30 – 13:30	**BREAK - Lunch**
13.30 – 15.00	**Identification of field-collected whiteflies (continued)**
15:00 – 15:30	**BREAK – Afternoon tea**
15:30 – 16:45	**Identification of field-collected whiteflies (continued)**
16.45 – 17.00	**Question session**
	Close of Day 4

Friday 20th April 2007

Time	SESSION 7 – INTRODUCTION TO MEALYBUGS
08:30 – 09.15	**Introduction to mealybugs**
09.15– 09.25	**Tips for slide-mounting mealybugs**
09.25 – 09.40	**Question session on slide-making problems**
09.40 – 10.00	**Mealybug look-alikes**
10.00 – 10.30	**BREAK – Morning tea**
10:30 – 11.05	**Morphology of mealybugs**
11.05 – 11.30	**Group work on character recognition**
11.30 – 12.30	**Group identification of mealybug look-alikes**
12:30 – 13:30	**BREAK - Lunch**
13.30 – 14.15	**Group identification of field-collected mealybugs**
14.15 – 14.55	**Identification of field-collected mealybugs**
14.55 – 15.00	**Online resources on mealybugs**
15:00 – 15:30	**BREAK – Afternoon tea**
15.30 – 16.45	**Identification of field-collected mealybugs (continued)**

16.45 – 17:00	**Question session**
	Close of Day 5

Saturday 21st April 2007

Time	SESSION 8 – IDENTIFICATION OF MEALYBUGS
08:30 – 10:00	**Identification of field-collected mealybugs (continued)**
10:00 – 10:30	**BREAK – Morning tea**
10:30 – 12:30	**Identification of field-collected mealybugs (continued)**
12:30 – 13:30	**BREAK - Lunch**
13:30 – 15:00	**Identification of field-collected mealybugs (continued)**
15:00 – 15:30	**BREAK – Afternoon tea**
15.30 – 16.45	**Identification of field-collected mealybugs (continued)**
16.45 – 17:00	**Question session**
	Close of Day 6

Sunday 22nd April 2007 - Free

Monday 23rd April 2007

Time	SESSION 9 - IDENTIFICATION OF MEALYBUGS
08:30 - 10.00	**Identification of field-collected mealybugs (continued)**
10:00 – 10:30	BREAK- Morning tea
10.30 – 12:30	**Identification of field-collected mealybugs (continued)**
12:30 – 13.30	**BREAK - Lunch**
13:30 – 15:00	**Identification of field-collected mealybugs (continued)**
15:00 – 15:30	**BREAK – Afternoon tea**
15.30 - 16.45	**Identification of field-collected mealybugs (continued)**
16.45 – 17:00	**Question session**
	Close of Day 7

Tuesday 24th April 2007

Time	SESSION 10 - IDENTIFICATION OF MEALYBUGS
08:30 - 10.00	**Identification of field-collected mealybugs (continued)**
10:00 – 10:30	BREAK- Morning tea

10.30 – 12:30	**Identification of field-collected mealybugs (continued)**
12:30 – 13.30	**BREAK - Lunch**
13:30 – 15:00	**Identification of field-collected mealybugs (continued)**
15:00 – 15:30	**BREAK – Afternoon tea**
15.30 - 16.45	**Identification of field-collected mealybugs (continued)**
16.45 – 17:00	**Question session**
	Close of Day 8

Wednesday 25th April 2007

Time	**SESSION 9 - IDENTIFICATION OF MEALYBUGS / WHITEFLIES**
08:30 - 10.00	**Identification of field-collected mealybugs / whiteflies**
10:00 – 10:30	BREAK- Morning tea
10.30 – 12:30	**Identification of field-collected mealybugs / whiteflies (continued)**
12:30 – 13.30	**BREAK - Lunch**
13:30 – 15:00	**Identification of field-collected mealybugs / whiteflies (continued)**
15:00 – 15:30	**BREAK – Afternoon tea**
15.30 - 16.45	**Identification of field-collected mealybugs / whiteflies (continued)**
16.45 – 17:00	**Question session**
	Close of Day 9

Thursday 26th April 2007

Time	**SESSION 9 - IDENTIFICATION OF MEALYBUGS / WHITEFLIES**
08:30 - 10.00	**Identification of field-collected mealybugs / whiteflies**
10:00 – 10:30	BREAK- Morning tea
10.30 – 12:30	**Identification of field-collected mealybugs / whiteflies (continued)**
12:30 – 13.30	**BREAK - Lunch**
13.30 – 14.15	**Final evaluation questionnaire**
14.15 – 15.00	**Packing up slides for travel**
15:00 – 15.30	**BREAK – Afternoon tea**
15.30 - 16.00	**General discussion**
16.00 – 17:00	**Closing Session and Presentation of Certificates**
	Close of Day 10

Friday 27th April 2007- Departure of Participants

Attachment E

LIST OF IDENTIFIED SPECIMENS OF LEAFMINERS, THRIPS, WHITEFLIES AND MEALYBUG PESTS COLLECTED FROM DIFFERENT LOCATIONS AND HOSTS/CROPS IN CHINA

No.	Name of Species*	Number of specimens	Location (specimen collected from)	Host/Crop	**Notes**
	1. Thrips				
1	*FranklinieUa occidentalis*	50	BeiJing and KunMing	Cotton, pepper, bean cucumber, eggplant	
2	*Thrips tapaci*	45	HeBei, HeNan	Cotton, string bean, onion, melon	
3	*Thrips palmi*	20	FuJian	Water melon, cucumber, eggplant	
4	*Scirtothrips dosalis*	20	FuJian	Tea	
5	*Gynaikothrips ficorum*	40	FuJian	*Ficus microcarpa*	
6	3 un-identified species	50 adults each	FuJian, BeiJing	flower	
	2. Leafminers				
1	*Liriomyza sativae*	50	BeiJing, HeBei, HeNan, ShangDong, KunMing	Cotton, cucumber, bean, tomato, eggplant, cabbage	
2	*Liriomyza huidobrensis*	20	YunNan	Tomato, cucumber, bean, string melon, chrysanthemum	
3	*Phytomyza atricormis*	20			
	3. Whiteflies				
1	*Bemisia tabaci*	100	BeiJing, Zejiang, HeNan, HeBei, ShanDong, ChongQing, YunNan	Tomato, cucumber, cotton, bean, cabbage, eggplant, weed	
2	*Trialeurodes*	100	BeiJing, ZeJiang, HeNan,	Tomato, cucumber, cotton, bean,	

	vaporariorum		HeBei, ShanDong, ShanXi	eggplant, weed	
3	*Dialeurodes citri*	50	BeiJing, FuZhou	Rose, Glossy Privet	
4	Aleurocanthus spiniferus	50	HuNan, FuZhou, HuBei	Tea, citrus	
	4. Mealybugs				
1	*Unaspis yanonensis*	20	BeiJing, FuZhou, HuNan	Orange, *Buxus sinica*	
2	*Drosicha corpulenta*	20	BeiJing, HeBei, HeNan	Popular, peach, apple, pear	
3	*Didesmococcus koreanus*	10	BeiJing, HeBei, ShanDong	Peach, apricot	
4	*Pseudococcus comstocki*	**10**	BeiJing, HeBei, HeNan, TianJin, FuJian	Cymbidium spp.	

*** Please record also the no. of un-identified specimens**

LIST OF IDENTIFIED SPECIMENS OF LEAFMINERS, THRIPS, WHITEFLIES AND MEALYBUGS PESTS COLLECTED FROM DIFFERENT LOCATIONS AND HOSTS/CROPS IN INDONESIA

No.	Name of Species*	Number of Specimens	Location (specimen collected from)	Host/Crop	Notes
	1. Thrips				Dr. Nina Maryana, Ms. Dewi Sartiami, Ms. Tri Murniningtyas, Mr. I Nyoman Raga
1.	*Ayyaria chaetophora*	1	West Java, Subang	Wing bean	
2.	*Frankliniella hemerocallis*	2	Central Java, Banjarnegara	Potato	
3.	*Frankliniella intonsa*	1	West Sumatera	Chilli pepper	
4.	*Haplothrips*	1 3 3 1	West Java, Bogor West Java, Ciloto West Java, Karawang West Java, Subang	Grass Rice Chilli pepper, Mango, Rice Soybean	
5.	*Haplothrips* sp.	1	West Java, Bogor	Corn	
6.	*Heliothrips haemorrhoidallis*	1	West Java, Karawang	Banana	
7.	*Megalurothrips sjosjeti*	1	West Java, Subang	Corn	
8.	*Megalurothrips usitatus*	5 1	West Java, Bogor West Java, Subang	Green bean, Mango, Nuts, Paprica, Weed Ground nut	
9.	*Mesothrips*	1	West Java, Bogor	*Ficus benjamina*	
10.	*Microcephalothrips abdominalis*	3 2	West Java, Bogor West Java, Cikampek	Chrysantemum Squash	
11.	*Thrips* sp.1	1	Central Java, Brebes	Potato	
12.	*Thrips* sp. 2	1	West Java, Bogor	Spring onion	
13.	*Pezothrips kellyanus*	1	Bali, Buleleng	Mango	
14.	*Thrips florum*	2 3	West Java, Bandung West Java, Bogor	Chilli pepper Caisin, orange	

No.	Name of Species*	Number of Specimens	Location (specimen collected from)	Host/Crop	Notes
		2	West Java, Ciloto	Guava	
		1	West Java, Bogor	Orange	
15.	*T. hawaiiensis*	3	East Java, Banyuwangi	Papaya	
			West Java, Bogor		
		4	West Java, Subang	Corn, Mango, Rose, Tea	
		1		Chilli pepper	
16.	*T. orientalis*	3	East Java, Kramat	Jasmine	
17.	*T. palmi*	1	West Java, Bandung	Kecubung (Indonesian)	
		1	West Java, Cikampek	Orchid	
18.	*T. parvispinus*	2	Central Java, Banjarnegara	Green bean	
		2	Central Java, Brebes	Chilli pepper	
		2	West Java, Bandung	Chilli pepper, *Datura metel*	
		4	West Java, Bogor	Chilli, Chilli pepper, Nasturtium, Nuts Green bean	
		1	West Java, Cikampek	Chilli pepper	
		2	West Java, Cipanas	Chilli pepper, Papaya	
		4	West Java, Karawang	Ipomoea, Mungbean	
		2	West Java, Subang	Chilli pepper	
		1	West Sumatra, Padang		
19.	*T. tabaci*	2	Central Java, Banjarnegara	Grass	
		3	West Java, Bogor	Chilli pepper, Mango	
20.	*Tubulifera* sp.1	2	West Java, Bogor	Orchid	
21.	*Tubulifera* sp.2	3	West Java, Cikampek	Rice	
22.	*Tubulifera* sp.3	2	West Java, Karawang	Chilli pepper	
23.	*Selenothrips rubrocintus*	5	West Java, Bogor	*Jatropha*	
24.	*Stenchaetothrips biformis*	2	West Java, Bogor	Rice	

No.	Name of Species*	Number of Specimens	Location (specimen collected from)	Host/Crop	Notes
	2. Leafminers				Dr. Nina Maryana, Mr. I Nyoman Raga
1.	*Liriomyza huidobrensis*	plenty	West Java, Central Java, West Sumatera	Potato, tomato, broccoli, french bean, sweet pea, celery, turnip, cabbage, dwarf white mustard (*Brassica chinensis*), kailan, spinach-*Sipancea oleraceae*, red bean, leek, onion, cucumber, choyote	
2.	*Liriomyza sativae*	plenty	West Java, Riau, South Sumatera	Tomato, celery, turnip, kailan, long bean, leek, cucumber, spinach (Amarantaceae)	
3.	*Liriomyza chinensis*	plenty	West Java, Central Java	Leek, onion	
4.	*Chromatomyia horticola*	plenty	West Java, Riau	Sweet pea	
	3. Whiteflies				Dr. Purnama Hidayat, Ms. Ripah Karyatiningsih
1.	*Aleurodicus dispersus*	3 1	West Java, Bogor Central Java, Kutoarjo	*Capsicum frutescens* L., *Ficus benjamina* Cassava	
2.	*Aleurodicus dugesii*	3	West Java. Bogor	*Syzygium samarangense*, *Hibiscus rosa-sinensis*	
3.	*Aleurodicus spiniferus*	2	West Java, Bogor	*Ficus benjamina*	
4.	*Aleurocanthus* sp.1	2	West Java, Bogor	*Dendrocalamus asper*	
5.	*Bemisia tabaci*	2 2	West Java, Bogor West Java, Bogor	*Phaseolus vulgaris* L. Eggplant	
6.	*Cocckerelliella* sp.1	2	West Java, Bogor	*Roystonea* sp.	
7.	*Dialeurodes* sp.	2	West Java, Bogor	*Coleus blumei*	
8.	*Dialeuphora decempuncta*	2	West Java, Bogor	*Persea americana*	
9.	*Parabemisia* sp.	2	West Java, Bogor	*Artacarpus heterophyllus*	
10.	*Rusostigma* sp.	2	West Java, Bogor	*Morinda citrifolia*	
11.	*Trialeurodes vaporariorum*	1	West Java, Sukabumi	Stringbean	

No.	Name of Species*	Number of Specimens	Location (specimen collected from)	Host/Crop	Notes
12.	*Trialeurodes* sp.	2	West Java, Bogor	*Psidium guajava*	
13.	*Whitefly* sp.1 (unidentified)	1	West Java. Bogor	*Saraca acosa* (Roxb)	
	4. Mealybugs				Dr. Purnama Hidayat, Ms. Ripah Karyatiningsih
1.	*Exallomochlus hispidus*	9 2	West Java, Bogor Central Sulawesi, Palu	Starfruit, jackfruit, guava, mango, banana, soursop, *Nephelium lappaceum*, *Annona squomosa*, palm (*Veitchia merrillii*) Cocoa	
2.	*Dysmicoccus brevipes*	2 3	West Java, Subang West Java, Bogor	Pineapple Jackfruit, pineapple, palm (*Veitchia merrillii*)	
3.	*Dysmicoccus* sp.	2	West Java, Bogor	Cananga	
4.	*Ferrisia virgata*	5	West Java, Bogor	Guava, *Nephelium lappaceum*, *Annona squomosa*, betel, ornamental plant	
5.	*Maconellicoccus hirsutus*	1	West Java, Bogor	Soursop	
6.	*Nipaecoccus nipae*	2	West Java, Bogor	*Zalacca edulis*	
7.	*Nipaecoccus viridis*	2	West Java, Bogor	Jackfruit	
8.	*Phenacoccus* sp.	3	West Java, Bogor	Starfruit, *Eugenia aquae*, *Nephelium lappaceum*	
9.	*Phenacoccus solani*	1 2	Jakarta West Java, Bogor	*Hibiscus* sp. *Hibiscus* sp.	
10.	*Planococcus lilacinus*	4 1 1	West Java, Bogor North Sumatera, Tanjung Morawa Central Sulawesi, Palu	Guava, *Nephelium lappaceum*, soursop, palm (*Veitchia merrillii*) Cocoa Cocoa	
11.	*Planococcus minor*	5	West Java, Bogor	*Hibiscus* sp., guava, banana, *Nephelium*	

No.	Name of Species*	Number of Specimens	Location (specimen collected from)	Host/Crop	Notes
				lappaceum, palm (*Veitchia merrillii*)	
12.	*Pseudococcus cryptus*	4	West Java, Bogor	*Eugenia aquae*, citrus, banana, palm (*Veitchia merrillii*)	
13.	*Pseudococcus comstocki*	3	Jakarta	*Nephelium lappaceum*	
14.	*Rastrococcus* sp.1	2	West Java, Bogor	*Eugenia* sp.	
15.	*Rastrococcus* sp.2	2	West Java, Bogor	Banana, *Nephelium lappaceum*	
16.	*R. spinosus*	4	West Java, Bogor	Citrus, jackfruit, mango,ornamental plant	

* Please record also the number of unidentified specimens

LIST OF IDENTIFIED SPECIMENS OF LEAFMINERS, THRIPS, WHITEFLIES AND MEALYBUG PESTS COLLECTED FROM DIFFERENT LOCATIONS AND HOSTS/CROPS IN MALAYSIA

No.	Pest	Scientific Name	Number of Species	Location	Host	Reff
1	**Thrips**	*Anascirtothrips arorai*	1	Perlis	Mango	
2		*Dichromothrips corbetti*	2	Negeri Sembilan, Selangor, Johor	Brinjal	
3		*Frankliniella occidentalis*	6	Pahang	Chrysanthemum	
4		*Megalurothrips usitatus*	1	Pahang	French bean	
5		*Microcephalothrips abdominalis*	1	Kedah	Citrus	
6		*Scirtothrips dorsalis*	98	Perlis, Kedah, Melaka, Kelantan	Mango, Grape, Watermelon	
7		*Thrips aspius*	1	Kedah	Mango	
8		*Thrips hawaiiensis*	48	Kedah, Perlis, Perak	Mango, Citrus, Papaya	
9		*Thrips palmi*	17	Selangor, Terengganu	Rockmelon, Brinjal	
10		*Thrips parvispinus*	11	Selangor, Terengganu, Pulau Pinang, Johor, Pahang	Starfruit, Papaya, Long Bean, Brinjal, French Bean, Chilli	
11		*Thrips tabaci*	1	Kedah	Mango	
12	**Whitefly**	*Aleurodicus dispersus*	95	Negeri Sembilan, Selangor, Johor	Chilli, French bean	
13		*Bemisia tabaci*	15	Melaka	Mango	
14		*Dialeuropora decempuncta*	15	Terengganu	Brinjal	
15		*Trialeurodes vaporaniorum*	12	Pahang	Brinjal	
16	**Mealybugs**	*Dysmicoccus neobrevipes*	7	Perak, Selangor, Johor	Rambutan, Manggo, Pineapple, Brinjal	
17		*Exallomochlus hispidus*	1	Perak	Rambutan	

18		*Ferrisia virgata*	13	Kedah	Mango, Citrus	
19		*Margarodidae imm*	3	kedah	Mango, Citrus	
20		*Paraputo sp.*	1	Perak	Rambutan	
21		*Pseudococcus cryptus*	38	Kedah, Johor	Mango, Citrus, Rambutan, Brinjal	
22		*Rastrococcus spinosus*	40	Kedah, Perlis, Melaka	Mango, Citrus	
23		*Rastrococcus tropicasiaticus*	1	Kedah	Citrus	

LIST OF IDENTIFIED SPECIMENS OF LEAFMINERS, THRIPS, WHITEFLIES AND MEALYBUG PESTS COLLECTED FROM DIFFERENT LOCATIONS AND HOSTS/CROPS IN THE PHILIPPINES

No.	Name of Species*	Number of Specimens	Location (specimen collected from)	Host/Crop	Notes
	Thrips				
1	*Thrips tabaci*	50	Bongabon, Nueva Ecija	Cucumber, Garlic	
2	*Megalurothrips usitatus*	10	Bongabon, Nueva Ecija	Stringbean	
3	*Phibalothrips longiceps*	16	San Marcelino, Zambales	Grass	
4	*Arorathrips spiniceps*	10	Indang, Cavite	Cucumber	
5	*Chaetanaphothrips signipennis*	15	Indang, Cavite	Anthurium	
6	*Scirtothrips dorsalis*	20	Guimaras, Iloilo	Mango	
7	*Haplothrips sp.*	6	Guimaras, Iloilo	Rose	
8	*Haplothrips fungulus*	20	Guimaras, Iloilo	Ficus	
9	*Thrips hawailensis*	8 20	Indang, Cavite Guimaras, Iloilo	Rose Sibukaw	
10	*Phaleothrips sp.*	50	Indang, Cavite	Pineapple	
11	*Frankliniella henerocallis*	40 30	Guimaras, Iloilo Benguet, Mt. Province	Rose Strawberry	
12	*Frankliniella occidentallis*	30	Benguet, Mt. Province	Tomato, Parseley, Bell Pepper	
13	*Microcephalothrips abdominalis*	10	Benguet, Mt. Province	Radish	
14	*Frankliniella williamsi*	10	Sta Barbara, Pangasinan, Pinamalayan, Occ. Mindoro	Corn Garlic, Onion, Amaranthus	
15	*Thrips palmi*	60	Los Baños, Laguna	Cotton, Cucumber, Eggplant	
16	*Stanchateton biformis*	10	Los Baños, Laguna	Rice	
17	Family *Panchaetotripinae*	20	Los Baños, Laguna	Ficus	

	Leafminers				
1	*Agromyza parvicornis*	30	Tarlac, Tarlac, Lubao, Pampanga, Los Baños, Laguna	Corn	New pest records; Collection continuing
2	*Chromotomya horticola*	50	Los Baños, Laguna, Mexico, Pampanga	String beans, Pole beans	
3	*Liriomyza bryoniae*	2	Bongabon, Nueva Ecija	Onion	New pest record; collections to be continued from April 2008 to May 2008
4	*Liriomyza chinensis*	15	Benguet, Mt. Province	Cabbage, Brassica	
5	*Liriomyza huidobrensis*	25	Benguet, Mt. Province	Potato, Tomato	Parasites collected
6	*Liriomyza sativae*	40	Benguet Mt. Province, Tiaong Quezon, Indang, Cavite	Tomato, Eggplant	
7	*Liriomyza trifolii*	50	Bongabon, Nueva Ecija, Vigan, Ilocos Sur	Onion, Garlic	
	Whiteflies				
1	*Aleurocanthus woglumi*	6	San Fernando La Union, Lipa City, Batangas	Eggplant	
2	*Aleurocanthus spinosus*	8 4	Indang, Cavite	*Annona muricata* Citurs sp.	
3	*Aleurodicus destructor*	10	Villasis, Pangasinan	Banana	
4	*Aleurodicus dispersus*	20 5 5 4	Los Baños, Laguna Los Baños, Laguna Los Baños, Laguna Los Baños, Laguna	*Cassia sp.* Eggplant Banana	
5	*Aleurothrixus floccosus*	4	Anao, Mexico, Pampanga	Guava	

6	*Bemicia tabaci*	25	Lipa City, Batangas	Squash	
7	*Dialeurodes citri*	5	Tiaong, Quezon	Citrus	
8	*Trialeurodes vaporarium*	8	Benguet, Mt. Prov.	Bean	
	Mealybugs				
1	*Dysmicoccus brevipes*	15	Tanauan, Batangas	Guava	
2	*Dysmicoccus neobrevipes*	10	Sta Barbara, Pangasinan	Tomato	
3	*Ferrisia virgata*	8	Anao, Mexico Pampanga	Papaya	
4	*Maconellicoccus hirsutus*	6	Indang, Cavite	Mango	
5	*Nipaecoccus nipae*	80	Indang, Cavite Los Baños, Laguna Sta Barbara, Pangasinan, Lake Sebu Tiboli, South Cotabato	Coconut, Lansones Durian Guava	New pest of fruits, vegetables, flowering plants and plantation crops.
6	*Nipaecocus viridis*	10	Laoag, Ilocos Norte	Eggplant	
7	*Plancoccus citri*	5	Pinamalayan, Occ. Mindoro	Citrus	
8	*Plancoccus lilacinus*	8	San Marcelino, Zambales	Mango	
9	*Pseudococcus longispinus*	6	Ipil, Camarines Sur	Coconut	
10	*Saccharicoccus sacchari*	4	Floridablanca, Pampanga	Sugarcane	

LIST OF IDENTIFIED SPECIMENS OF LEAFMINERS, THRIPS, WHITEFLIES, MEALYBUG PESTS COLLECTED FROM DIFFERENT LOCATIONS AND HOSTS/CROPS IN VIET NAM

No.	Name of Species*	Number of specimens	Location (specimen collected from)	Host/Crop	Notes
	1. Thrips			*Phaseolus vulgaris*	
1	*Megaluzathrips* sp.	9	Ha Noi, Ha Tay, Hung Yen	*Phaseolus vulgaris*	
2	*Thrip hawaiin* Morgan	1	Ha Noi	*Citrus* spp.	
3	*Thrip* sp	2	Ha Noi, Vinh Phuc	*Phaseolus vulgaris*	
4	*Frankkliniella intosa* (Trybon),	2	Ha Noi, Ha Tay	*Citrus* spp.	
5	*Scirthrips dorsalis* Hood	2	Ha Noi, Hung Yen	*Citrus* spp.	
	2. Leafminers				
1	*Liriomyza huidobrensis* (Blanchard)	2	Ha Noi, Vinh Phuc	Pea	
2	*Liriomyza sativae* (Blanchard)	5	Ha Noi, Ha Tay, Vinh Phuc	*Chrysanthemum*	
3	*Liriomyza trifolii* (Burgess)	1	Ha Noi	Legumes	
4	*Liriomyza bryoniae* (Kaltenbach)	1	Ha Noi	*Solanum*	
5	*Liriomyza chinensis* Kato	1	Ha Noi	Chinese Cabbage	
6	*Liriomyza brassicae* (Riley)	2	Ha Noi	Brassiceae	
	3. Whiteflies				
1	*Aleurocanthus spiniferus* (Quaintance)	4	Ha Noi, Ha Tay, Hung Yen, Hoa Binh,	*Citrus* spp.	
	4. Mealybugs				
1	*Dysmicoccus brevipes* Koch	2	Ninh Binh	Pineapple	
2	*Planococcus citri* Risso	2	Ha Noi, Ha Tay	Citrus spp.	

* Please record also the no. of un-identified specimens.