



**Two Months Attachment Program on
The Host Plant and Parasitoid Preferences of
Leafminer Flies in Altitudinal Distribution**

at
the Museum Zoologicum Bogoriense, LIPI, Cibinong, Indonesia
15th January to 17th March, 2017

Organized by:



Museum Zoologicum Bogoriense, LIPI

In Collaboration with:



ASEAN Network on Taxonomy

2017

**ATTACHMENT PROGRAM ON ADVANCE THE HOST PLANT AND
PARASITOID PREFERENCE OF LEAFMINER FLIES IN
ALTITUDINAL DISTRIBUTION
(JAIF Funded Project on Taxonomic Capacity Building to Support
Market Access for Agricultural Trade in the ASEAN Region)**

Venue:

Division of Zoology “Museum Zoologicum Bogoriense”, Research Center
for Biology, Indonesian Institute of Science, Cibinong, Bogor, Indonesia

Duration:

15 January – 11 March 2017

Name of Participant

Mohd Sanusi Mohd Kasim
Agriculture Officer

Institutional Address and Country:

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Malaysia.

1. Background

The Attachment Program on Leafminers of Agriculture Importance was held at the Museum Zoologicum Bogoriense, Centre for Research Development in Biology, LIPI, Cibinong, Bogor, Indonesia from 16 February to 11 March 2017. This internship training is one of the The ASEAN Plant Health Cooperation Network (APHCN) of ASEANET program for Taxonomic capacity building to support market access for agricultural trade in the ASEAN region funded by Japan ASEAN Integration Fund (JAIF). The purpose of training is to Develop and strengthen capacities among the ASEAN Member States (AMS) in taxonomic knowledge to be able to accurately diagnose and identify pests and diseases and manage quarantine risks associated with agricultural commodities

Previous training workshops that were conducted in years 2016 have been focusing on basic knowledge about the concept of leafminers as economic insect pest in horticultural crops and their management. A series of two month attachments program were conducted to enhance capabilities of diagnostics in identification of important leafminer pests and their parasitoids. This attachment program was designed into (3) three major activities including laboratory studies, field exercises and specimens collection study in order to provide technical knowledges on diagnostic and taxonomic skills in identification species. The trainee were exposed on surveillance technique, method of sampling and rearing, mounting specimens and taxonomic skills in identifying the species of leafminers and parasitoids that associated with leafminer.

2. Objective :

The objectives of the trainings are:

- a) To provide and enhance diagnostic skills for identification of leafminers and their parasitoid
- b) To gain deep understanding on surveillance technique and method used for sampling, rearing, mounting and data analysis of leafminers and parasitoid
- c) To study the distribution of leaf miner species and parasitoids with different altitude in agriculture production area

3. Tentative Training Program

| Date | Mentor | Mentor |
|----------------------------|---|---|
| 15 Jan 2017 (Sunday) | <ul style="list-style-type: none"> • Arrived in Bogor, Jakarta. | |
| 16 Jan 2017 (Monday) | <ul style="list-style-type: none"> • Briefing and orientation. <ul style="list-style-type: none"> • Administration, accommodation, transportation and management support. • Visit Insect laboratory and Insect Collection | Ms Gina Andriana Prof Dr Rosichon |
| 17 Jan 2017 (Tuesday) | <ul style="list-style-type: none"> • Briefing and discussion of work program for 2 month internship training • Introduction of Flies (Diptera), Taxonomy and Morphological Character of Diptera. • Collection Method and Dried Specimens | Prof Dr Rosichon Dr Awit Suwito Mr Darmawan |
| 18 Jan 2017 (Wednesday) | <ul style="list-style-type: none"> • Study Museum collection • Discussion on program of surveillance of leafminers and their parasitic waps | Prof Dr Rosichon Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 19 Jan 2017 (Thursday) | <ul style="list-style-type: none"> • Preparation equipment for fieldwork <ul style="list-style-type: none"> • Program survey of liriomyza leafminers and their parasitic waps on 21-23 Jan 2017 in Agriculture Production Area, Banjarnegara-Wonosobo, Central Java. | Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 20 Jan 2017 (Friday) | <ul style="list-style-type: none"> • Depart to Banjarnegara for Program survey of liriomyza leafminers and their parasitic waps. | Prof Dr Rosichon Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 21 Jan 2017 (Saturday) | <ul style="list-style-type: none"> • Field work <ul style="list-style-type: none"> • Survey of liriomyza leafminers and their parasitod in Banjarnegara-Wonosobo, Central Java. | |
| 22 Jan 2017 (Sunday) | <ul style="list-style-type: none"> • Field work <ul style="list-style-type: none"> • Survey of liriomyza leafminers and their parasitod in Banjarnegara-Wonosobo, Central Java. | |
| 23 Jan 2017 (Monday) | <ul style="list-style-type: none"> • Field work <ul style="list-style-type: none"> • Surveillance of liriomyza leafminers and their parasitod in Banjarnegara-Wonosobo, Central Java. | |
| 24 Jan 2017 (Tuesday) | <ul style="list-style-type: none"> • Return to LIPI, Cibinong. | |

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| 25 Jan 2017 (Wednesday) | <ul style="list-style-type: none"> • Preparing laboratory equipments and museum collections | Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 26 Jan 2017 (Thursday) | <ul style="list-style-type: none"> • Laboratory works • Proses sampling for rearing and record data | Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 27 Jan 2017 (Friday) | <ul style="list-style-type: none"> • Laboratory works • Observe rearing sample and Sorting sweeping sample | Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 30Jan 2017 (Monday) | <ul style="list-style-type: none"> • Laboratory works • Observe rearing sample and Sorting sweeping sample | Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 31 Jan 2017 (Tuesday) | <ul style="list-style-type: none"> • Demonstration using Dino lite digital microscope for imaging specimen, • Combine multilayer image using Helicone focus / Combine ZP, • Editing pictures using Adobe Photoshope, Technical drawing specimens digital/manual | Dr Awit Suwito Mr Darmawan |
| 1 Feb 2017 (Wednesday) | <ul style="list-style-type: none"> • Laboratory works • Observe rearing sample and Sorting sweeping sample | Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 2 Feb 2017 (Thursday) | <ul style="list-style-type: none"> • Laboratory works • Observe rearing sample and Sorting sweeping sample | |
| 3 Feb 2017 (Friday) | <ul style="list-style-type: none"> • Laboratory works • Observe rearing sample and Sorting sweeping sample • Disscusion on temporary result on rearing liriomyza and parasitic waps | Prof Dr Rosichon Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 6 Feb 2017 (Monday) | <ul style="list-style-type: none"> • Laboratory works • Observe rearing sample and mounting dried specimen | Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 7 Feb 2017 (Tuesday) | <ul style="list-style-type: none"> • Laboratory works • Observe rearing sample and mounting dried specimen | Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 8 Feb 2017 (Wednesday) | <ul style="list-style-type: none"> • Discussion and identification • Morphological character of Liriomyza and their parasitod | Prof Dr Rosichon Dr Awit Suwito Mr Darmawan Mr Giyanto |

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| 9 Feb 2017 (Thursday) | <ul style="list-style-type: none"> • Mounting, labelling and Identification specimens | Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 10 Feb 2017 (Friday) | <ul style="list-style-type: none"> • Mounting, labelling and Identification specimens • Preservation and mounting dried specimens using HMDS (1,1,1,3,3,3-HEXAMETHYLDISILAZANE) | Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 13 Feb 2017 (Monday) | <ul style="list-style-type: none"> • Mounting, labelling and Identification specimens • Study specimens of liriomyza and parasitic waps morphological character of leafminers and parasitic waps | Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 14 Feb 2017 (Tuesday) | <ul style="list-style-type: none"> • Disscusion on temporary result on rearing liriomyza and parasitic waps • Identification to liriomyza species and parasitic waps | Prof Dr Rosichon Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 15 Feb 2017 (Wednesday) | <ul style="list-style-type: none"> • Study specimens collection • Identification to liriomyza species and parasitic waps | Prof Dr Rosichon Dr Awit Suwito |
| 16 Feb 2017 (Thursday) | <ul style="list-style-type: none"> • Study specimens collection • Identification to liriomyza species and parasitic waps | Prof Dr Rosichon Dr Awit Suwito |
| 17 Feb 2017 (Friday) | <ul style="list-style-type: none"> • Study specimens collection • Identification to liriomyza species and parasitic waps | Prof Dr Rosichon Dr Awit Suwito |
| 20 Feb 2017 (Monday) | <ul style="list-style-type: none"> • Study specimens collection • Identification to liriomyza species and parasitic waps • Disscusion on temporary result on rearing liriomyza and parasitic waps | Prof Dr Rosichon Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 21 Feb 2017 (Tuesday) | <ul style="list-style-type: none"> • Study specimens collection • Capturing image technique using Dino lite digital | Dr Awit Suwito Mr Darmawan |
| 22 Feb 2017 (Wednesday) | <ul style="list-style-type: none"> • Study specimens collection • Capturing image technique using Dino lite digital | Dr Awit Suwito Mr Darmawan |
| 23 Feb 2017 (Thursday) | <ul style="list-style-type: none"> • Study specimens collection • Capturing image technique using Dino lite digital | Prof Dr Rosichon Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 24 Feb 2017 (Friday) | <ul style="list-style-type: none"> • Study specimens collection • Identification to liriomyza species and parasitic waps | Prof Dr Rosichon Dr Awit Suwito Mr Darmawan Mr Giyanto |

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| 27 Feb 2017 (Monday) | <ul style="list-style-type: none"> • Discussion and identification of parasitic wasps - Pteromalidae, Fitigidae, Eulophidae | |
| 28 Feb 2017 (Tuesday) | <ul style="list-style-type: none"> • Study specimens collection • Identification to liriomyza species and parasitic wasps • Discussion and identification of parasitic wasps - Pteromalidae, Fitigidae, Eulophidae | Prof Dr Rosichon Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 1 Mac 2017 (Wednesday) | <ul style="list-style-type: none"> • Study specimens collection • Identification to liriomyza species and parasitic wasps • Discussion and identification of parasitic wasps - Pteromalidae, Fitigidae, Eulophidae | Prof Dr Rosichon Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 2 Mac 2017 (Thursday) | <ul style="list-style-type: none"> • Study specimens collection • Identification to liriomyza species and parasitic wasps • Discussion and identification of parasitic wasps - Pteromalidae, Fitigidae, Eulophidae | Prof Dr Rosichon Dr Awit Suwito Mr Darmawan Mr Giyanto |
| 3 Mac 2017 (Friday) | <ul style="list-style-type: none"> • Discussion on temporary result on rearing liriomyza and parasitic wasps | Prof Dr Rosichon Dr Awit Suwito |
| 6 Mac 2017 (Monday) | <ul style="list-style-type: none"> • Data analysis and training report | Dr Hari Sutrisno. Dr Awit Suwito |
| 7 Mac 2017 (Tuesday) | <ul style="list-style-type: none"> • Data analysis and training report | Dr Hari Sutrisno. Dr Awit Suwito |
| 8 Mac 2017 (Wednesday) | <ul style="list-style-type: none"> • Data analysis and training report | Dr Hari Sutrisno. Dr Awit Suwito |
| 9 Mac 2017 (Thursday) | <ul style="list-style-type: none"> • Presentation of the result training at MZB | Prof Dr Rosichon Dr Awit Suwito |
| 10 Mac 2017 (Friday) | <ul style="list-style-type: none"> • Free segment | |

4. Program activities

4.1 Field studies

Prof Dr Roshichon began the 1st session by a briefing on training activities, laboratory exercise, specimens collection studies, surveillance and resource persons who involved for this 2 month attachment program. He highlighted the importance of expert development for insect pest identification and surveillance. He also recommended trainee to take opportunity from this training to enhance knowledge and skill, to share experience and extension technology for agriculture benefit in future especially related leafminers and their parasitoid.

Several discussion and the preparation for the program of survey of leafminer and parasitoid have taken place to identify altitudinal sampling points and specimen collecting methods. The necessary equipment for the surveillance and collection samples were prepared properly.

The survey was carried out on 21-25 January 2017 in agriculture production areas Banjarnegara - Wonosobo, Central Java with objective is to study the distribution and diversity of *liriomyza* species and their parasitoid with different altitude. The survey was laid down under randomized survey point focusing on several host plants with different altitude from the lowers at 100 meters to the higher 2200 meters above sea level.

4.2 Laboratory studies

Trainee working in the lab to correctly and effectively process all collected samples. The infested leaves and sweeping samples have been taken for rearing and laboratory observation. The infested leaves were placed individually in rearing cups. Rearing larvae and pupae were observed every day until the emergence of leafminers and parasitoids within at least 30 days. While, the sweeping samples were sorted from any non-targeted insects and foreign materials.

Any emergence of insect from infected leaf samples will be collected and preserved into 70% alcohol for preservation. The small specimens were handled carefully to be pinned directly on the body with insects pinned precisely. Morphological character of each specimens were observed under microscope for identification

The rest of month was spent in the laboratory, where trainee has been exposed to learn on samples management such as rearing, sorting, mounting specimens, labelling and data recording. The trainee also has to learn and well-understand an important character of targeted specimens of leafminers and parasitoids precisely during sorting and data recording. The basic characteristic focused on Leafminer (Agromizidae) and Parasitoid (Figitidae, Pteromalidae, Eulophidae & Braconidae)

5.3 Specimens Collection Study

The majority of day was spent in the Insect Collection Centre where trainee began the process of identifying the specimens collected from the field survey. Prof Dr Rosichon and Dr Awit Suwito provided a number of references and keys of illustrations both electronic and physical copies to assist the trainee to properly key out the specimens (Annex 3).

There were several lectures, discussions and demonstrations about the technique of mounting and labelling specimens, managing specimens and identifications of leaf miners and parasitoid species. Prof Dr Rosichon gave an explanation on identification of parasitoids. He emphasized an important morphological character to distinguished species among parasitoids that associated with leafminers.

Began identifying the various structures of the *liriomyza* species and their parasitoid under microscope. Several species of leafminers and parasitoids were found such as Agromizidae (*Liriomyza hudobriensis*, *L. sativae*, and *L. chinensis*); and parasitoids - Figitidae (*Gronotoma micromorpha*, *Nordlanderia plowa*), Braconidae (*Opius chromatomyiae*) Eulophidae (*Hemiptarseus varicornis*, *Quadrastichus*

liriomyza, *Asecodes erxias*, *Asecodes delucchii*, *Chrysocharis pentheus*).

The result survey shown that leafminer species *Liriomyza huidoriensis* was found in highland production areas Banjanegara-Wonosobo from with altitude above altitude 1147 to 2076 meters. While, *L. sativae* was found in lowland areas to the highest altitude 1151 meters.

The braconid parasitoid, *Opius chromatomyiae* seems to be the dominant species 1000 meters. This species was collected with the great number around 400 specimens with more than 80% caught by sweeping net and the rest emerged from rearing samples.

The information gathered through our field surveys could be used to alert growers and agriculture officers for the presence of leafminer pests and outbreaks. It will help to determine pest trends affecting agricultural management practices and any programs related in developing biological control agents using parasitoids. Result survey shown in Annex 1.

4.5 Others activities

Dr Awit Suwito gave a lecture on Introduction of diptera, morphology characteristic, and method of collection and preservation. Preservation and mounting dried specimens using HMDS (1,1,1,3,3,3-HEXAMETHYLDISILAZANE) to avoid dried specimens from shrink and crumple and keep the specimens look fresh and better. He also demonstrates an imaging specimens performed by Dino lite digital microscope including magnification and measurement of specimens. The multilayer focus image will be combined by using Helicone focus / Combine ZP. This focus staking technique give an advantage to create eye-catching image and make an images stand out (Annex 2).

On the last week, a data survey and result discussed for report submission to CABI and Research Center for Biology, Indonesian Institute of Science (LIPI). The presentation of attachment program

outcomes and handing out of certificates brought the two-month attachment program to a close.

5. Summary of Attachment

This attachment program produced very significant and meaningful. Direct coaching from experts provides opportunity for the trainee to be more focused during learning session. This opportunity would help to enhance capacity with better understanding of knowledge and skills in implementing pest surveillance, field diagnostic and familiarized with the insect morphological character for identification. The trainee has Detail reference materials provided most likely to be useful in identification species and data analysis. The results of the survey would benefit for monitoring population dynamic of leafminer pests and further research and development of biological control agents using parasitoid against leafminer pests. As a trainee of attachment program, knowledge sharing and experience in pest surveillance, country's pest of concerns and their management become more interesting. Through the presentation in the end of attachment program, have shared lessons and experience in pest surveillance. It also provides an opportunity to express priorities of concerns and interest on the pests and crops in association with trade.

6. Recommendation for Future Activities

The several future activities were identified as follows:

- Conduct training for technical officer to increase capability in insect diagnostic association with leafminers and parasitoids
- Update national information and collection of leafminer pests and parasitoids
- Collaboration and exchange information among SEA Countries in developing short-term and long term strategies for the project related leafminers and parasitoids.

7. Acknowledgement

I would like to express my deepest appreciation to the sponsor of this project, Japan-ASEAN Integration Fund (JAIF) for giving the opportunity to ASEAN countries to involve in this capacity building program.

I would like to thank to Dr.Lum Keng Yeang and Dr. Soetikno Selamat for giving me chance to be selected for the attachment program in Indonesia. This attachment program opportunity I had was a great chance for learning and technical skill development in diagnostic of insects. It was a pleasure to meet great people and professionals, shared their experiences and knowledges through this training period.

I also would like to express my deepest thanks to Prof Dr Roshichon, Dr Hari Sutrisno, Dr Awit Suwito, Mr Darmawan and Mr Giyanto for their valuable guidance and support that had provided right from the beginning till the successful completion of attachment program. Thank you very much for everything.