

ANNEX 1: REPORT-THE THIRD REGIONAL EXPERTISE TRAINING WORKSHOP ON PEST SURVEILLANCE

11-14 November 2014
Phnom Penh, Cambodia



Summary

The 3rd Regional Expertise Training Workshop on Pest Surveillance has been implemented in Phnom Penh, Cambodia on 11-14 November 2014 with 26 participants including 22 trainees from 5 participating countries, 2 experts from Korea and 2 officers from FAO Regional office for Asia and the Pacific (FAO/RAP). Opening remark was delivered by Mr. Chang-Ho Shin, Project Coordinator, on behalf of Dr. Yongfan Piao, Lead Technical Officer of the project and Senior Plant Protection Officer, FAO/RAP, welcoming the participants and the experts to the workshop, which was followed by welcome address by Dr. Hean Vanhan, Deputy Director General of General Directorate of Cambodia. Dr. Seung-Hun Yu, Professor of Chung-Nam National University, and Dr. Ik-Hwa Hyun, Senior Researcher of Animal and Plant Quarantine Agency of the Korean Government, gave lectures with diverse topics on "Fungi" including "Importance of fungal diseases", "Characters and taxonomy of fungi", "Major symptoms of fungal diseases" and "Importance and Identification of diverse fungal species". A country report on "Plant Diseases Caused by Fusarium in Thailand" was delivered by Dr. Somrith Apirusht from Plant Protection Research and Development Office of Thailand. As an expertise event, there was a field trip to the crop fields to collect the samples which showed symptoms of fungal disease to use for on-site diagnosis as well as for laboratory practice. Practical training has been implemented in the meeting room with two microscopes provided by NPPO-Cambodia. It focused on identification of diverse fungal diseases using the specimens prepared by Korean experts and samples collected from the field trip. Two topics were discussed during the discussion session: "What are main fungus diseases with country concern" and "List of current or potential domestic technical supporting resource agencies

for the surveillance and identification concerned". Two evaluations were conducted just before the close of the meeting. Mr. Shin delivered the closing remark.

REPORT

1. Welcome remark

Mr. Shin, Project Coordinator, delivered the opening remark on behalf of Dr. Piao, Lead technical officer of FAO/RAP. He welcomed the participants and the experts to the workshop and expressed his special gratitude to NPPO-Cambodia for its sincere cooperation and elaboration as a hosting country of the workshop. He highlighted the importance of capacity development for pest surveillance and identification in South-East Asian countries and encouraged participants to use this training as a good opportunity to polish the expertise and to share information on other countries' situation as well as to strengthen the international network.

Dr. Hean Vanhan, Deputy Director General of General Directorate of Agriculture (GDA) of Cambodia, welcomed participants and expressed his appreciation to the FAO for working on harmonization and capacity building for the South-East Asian countries. He highlighted that pest surveillance is very important subject for all countries and this workshop will help to improve the knowledge in identifying the fungi. He wished everyone very fruitful meeting.

2. Lectures

Four subjects of the lectures on fungi were given by Dr. Hyun, Senior Researcher of Animal and Plant Quarantine Agency of the Korean Government, and Dr. Yu, Professor of Chung – Nam National University of Korea.

Importance of fungal diseases

Dr. Yu introduced the history of the plant pathology. The main emphasis of this lecture was on the theory of the disease triangle which includes pathogen, host plant and environment, highlighting some epidemic plant diseases which had affected human history such as Irish potato, Coffee Rust, South American Leaf Blight of rubber, India's Brown Spot of rice and Panama Disease of banana to emphasize the importance of fungal plant diseases. According to the history, outbreak of fungal diseases has caused not only serious damage on the plant production and economical losses but also, in some cases, severe starvation to human beings. He concluded that an important lesson learned from the history of such disease outbreaks is that human beings' greed for overproduction of the crops led the environment at risk of disease epidemics.

Characters and taxonomy of fungi

Dr. Yu introduced fungi's characteristics such as position on the "Universal Phylogenetic Tree", structures, composition, nutrition, reproduction etc. He also introduced fungal taxa divided into two categories: "True fungi" and "Fungus-like organisms". He explained five kinds of fungus as "True fungi" and seven kinds of "Fungus-like organisms" in detail on their characteristics, sexual reproduction and life cycle.

Major symptoms of fungal diseases

Dr. Hyun introduced the definition of symptoms as "external and internal reactions or alteration of plant as a result of a disease". It was highlighted that fungi caused local or general necrosis or killing of plant tissues, and they often result in reduced growth of plant organs or entire plants. The symptoms of diseases divided into three groups: fruit trees, vegetables and food crops. As for the diseases on "fruit trees", he introduced "Powdery mildew", "Black spot", "Phomopsis blight", "Cercispora leaf spot", "Sclerotinia rot", "Late blight" and so on. He also introduced "Scab", "Rust", "Leaf spot", "White rot", "Anthracnose", "Root and crown rot", "Sooty mold" and "Bird's eye rot" as diseases of "vegetables" and "False smut", "Brown spot", "Sheath blight" and "Blast" as diseases of "food crop".

Importance and Identification of diverse fungal species

Five fungal species were the topics of these lectures: *Alternaria*, *Bipolaris*, *Curvularia*, *Fusarium* and *Colletotrichum*. The lecture on *Alternaria* was presented by Dr. Yu and the rest of species were presented by Dr. Hyun. They introduced general features such as conidiophores, conidia, sexual state, host and disease caused, symptoms of diseases, distribution and distinguished characters in details for each species.

3. Country report

Dr. Somrith Apirusht from Plant Protection Research and Development Office of Thailand presented country reports on "Plant diseases caused by *Fusarium* in Thailand". He introduced that *Fusarium* has been one of the most devastating plant pathogenic genus, causing major plant diseases not only in Thailand but also in other countries. He also introduced research activities regarding *Fusarium*, performed by Department of Agriculture (DOA) of Thailand. Research activities include disease specimens' collection and isolation of a causal pathogen from the diseased plants. He highlighted six kinds of *Fusarium* species which were found and collected in Thailand such as *F. graminearum* Schwabe, *F. semitectum* Berk, *F. solani* (Mart.) Appel, *F. oxysporum* Schlecht, *F. proliferatum* Nirenburg and *F. moniliforme* Sheldon, describing their characters in detail.



4. Field trip

As one of the events for real practice, participants took a field trip to the crop fields located in a rural area where cucumber, long bean, banana and eggplant were growing. Participants collected the samples from the crops which showed the symptoms of fungal diseases for on-site diagnosis in consultation with Korean experts, whereas some samples were collected for the practice training. However, not many plants infected with fungal diseases were found as the pests and diseases were already well controlled by farmers.

5. Laboratory practice

To improve personal capacity in implementation of pest identification, practical training has been included in the workshop program. However, the laboratory of NPPO-Cambodia was not available due to other important international event, so practical training had to be performed in the meeting room under the guidance of two Korean experts.

Two microscopes were provided by NPPO-Cambodia as well as some expendable material such as forceps, water agars and petri dishes for the practice. Fungus specimens were provided by the Korean experts for the microscope examination.

Practices were mainly focused on how to identify the fungus' species through the use of the microscopes and specimens. Stereo microscope was used to examine the growth habit characteristics, whereas compound microscope was used to examine the morphological characteristics of the fungus, making a comparison of the specimens.

Keynote of the comparison was placed on the color, size, shape and structure of the Conidiophore and the Conidia for each taxonomic group. Korean experts emphasized that, in comparing the fungus, trainees should avoid confusion with similar fungus organisms and should be careful of the difference of microstructure such as hilum, beak and septum for accurate identification. He also let the trainees to draw morphological characters of the fungus on a sheet of paper by themselves to recognize and remember it clearly. In addition,

the lecturers briefly introduced the fungal herbarium techniques as well as fungi isolation and incubation techniques during the practice session. Collected samples from field trip were used to isolate the fungus from diseased plants.

6. Discussion session

Two topics, "What are main fungus diseases with country's concern" and "List of current or potential domestic technical supporting resource agencies for the surveillance and identification concerned", were discussed and presented by each country's participant. The summary of the presentation for the topics is as follow.

Cambodia exports the rice to Europe and China and natural rubber to China, but no diseases have found so far. However, some diseases have found in dry cassava exporting to China and in pepper to Europe, which were treated with chemicals and fumigation. Some projects on pest surveillance are supporting by FAO and ADB.

Lao PDR exports rice to Thailand, banana to China, corn to China and Viet Nam, rubber to China, cabbage, cassava and mango to Thailand, but *Fusarium* was found in exporting banana. Laos has used biological treatment to control soil-borne diseases. Two projects are supported by FAO and ADB.

Nepal introduced not only its exported and imported commodities but also a list of regulated fungal diseases. It also presented the list of detected diseases collected from imported plants such as apple, citrus, potato, ginger, garlic etc. as well as current situation on recently reported diseases. As for the resource agencies, it introduced that two or three projects regarding citrus and ginger have been implemented by the support of World Bank and FAO and that pest surveillance on cabbage and tomato has been supported by USA program. In addition, Ministry of Agriculture has performed the regular surveillance activities on the farm level.

Thailand introduced diverse diseases caused by bacteria and fungus in association with crops and regions occurred. As main activities are done by Department of Agriculture, so no list of technical supporting resource agencies was presented.

Viet Nam introduced some fungal diseases that caused huge damage on the crops. Rice Blast affected 457,000 ha of rice crop in 1991-1992 and Sheath Blast affected 21,500ha of rice crop in 1984. Banded Leaf and Sheath Blight also caused 20-40% of losses on maize crop. In addition, it listed other fungal diseases which have affected coffee, potato, tomato and groundnut. As for the technical supporting resource agencies, it introduced that Plant Protection Department (PPD) has an essential responsibility for carrying out pest surveillance activity.

7. Expertise evaluation

To assess the trainees' expertise on what they have learned during the workshop, the lecturers prepared a test which was composed of 14 questions including 4 short-answer questions. The score was ranging from 3 to 14 and average score was 11.5 with 4 perfect scores. 73% of trainees recorded over 12 point, but 18% of trainees were less than 7 point, which showed a big difference of expertise among the trainees.

8. Workshop evaluation

A questionnaire was distributed to the trainees to evaluate the workshop. The questionnaire was composed of following five sections: rating overall assessment of the project; rating the lecture and lecturers; rating the impact of the workshop; rating the logistics; and describing the strength, weakness of the workshop and suggestion.

According to the questionnaires collected from 22 participants, 95% of the trainees were content with overall project content, structure and organization. 99% of them were "satisfied" or "fully satisfied" with the lectures' presentation, attitude and expertise level, but 55% of them were not satisfied with the practice training as it was not implemented in the laboratory but did in the meeting room with insufficient equipment. 97% of trainees answered in the affirmative that this workshop would impact on their technical knowledge, professional activities and strengthening the regional/international network. As for the workshop logistics such as flight arrangement, accommodation and meeting facilities, 88% of the trainees expressed their satisfaction.

Meanwhile, participants described the main strength, weakness of the workshop and made suggestion as follow.

<Strength>

- Good lectures and presentation
- High level of expertise of the lecturers
- Good opportunity to improve knowledge
- Helpful to current work
- Updated information

<Weakness>

- Short duration of practice and field trip
- Short duration of workshop
- No laboratory practice
- Lack of equipment in practice
- Narrow coverage of the topics
- No colour printing guidebook
- Poor hotel arrangement

<Suggestion>

- More practice and field trip than lectures
 - Longer duration of workshop
 - Making practice training in the lab of NPPO
 - Deal with the country's specific problem during the lecture
 - Budget allocation for the countries for training
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9. Closing Remarks

Mr. Shin expressed his gratitude to the lecturers and other participants for their hard work and cooperation as well as to NPPO-Cambodia once again for its sincere cooperation and arrangement for the workshop as a hosting country.

He evaluated the workshop as it was very good opportunity for the trainees to increase their expertise on "fungi" as well as to develop their practical capacity on fungal disease identification through the field trip and practice training. On the other hand, he expressed a sense of frustration at the poor arrangement of accommodation and insufficient space for the practices. To conclude the workshop, he recommended the trainees to keep studying the contents of the lectures to maximize the benefit from training program.

10. The results of the Workshop

This workshop produced not only positive but also a bit disappointing results as follow.

Firstly, participants could increase specialized knowledge on "fungi" and upgrade the practical skill through well prepared lectures and practical training. Especially, trainees expressed their full confidence to the Korean experts for the high-level of expertise and earnest attitude.

Secondly, country report delivered by Dr. Apirusht from Thailand was good material for the participants to understand and share information on the fungus identification status in Thailand, which would attract other countries' more attention on the fungi research.

Thirdly, although lab practice was surely good event to increase the expertise level of the participants, they could not have enough opportunity to take part in the practice because of insufficient lab equipment as well as limited space. As we can see the results of the workshop assessment, many trainees pointed out this matter. In this regard, more careful attention has to be paid in preparation of lab practices for the forthcoming workshop.

Fourthly, although discussion topics were informed to the trainees beforehand the workshop, most of them have not prepared for the discussion and even some have no basic information. Therefore, workshop organizer needs to encourage the participants to

understand the background and objective of the topics and to prepare for the presentation in advance for the fruitful results of the discussion.

Lastly, due to the big difference of the expertise level among trainees, some of them could not follow the lectures and practice training, whereas some of them might feel it easy. In this regard, in-country training of similar expertise level of trainees seems to be indispensable from now on.

11. A list of follow-up actions

Based on the project work-plan and the results of this workshop, some actions to be followed up in implementation of the project will be as follows.

- Preparation of the 1st Regional Expertise Training Workshop on Information Management.
- Preparation of Steering Committee to adjust the training program and project work-plan
- Preparation of in-country training workshop on Bacteria and Phytoplasma scheduled to be held in Bangkok in January 2015.
- Consultation with hosting countries of the scheduled in-country workshops about detailed training program
- Expedite the laboratory equipment procurement to support diagnostic capacity of the participating countries

Annex 1, Agenda for the Workshop

Day-1 (Nov. 11, 2014)

Time	Session	Facilitator
09:00 – 09:30	Registration	
Opening Session		
09:30 - 09:45	Welcome remark	Project Coordinator
09:45 - 10:00	Group photo and Coffee break	
Session 1: Lecture (1)		
10:00 - 12:00	Importance of fungal diseases(L)	Dr. Ik-Hwa Hyun
12:00 - 13:30	Lunch	
13:30 – 14:30	Characters and taxonomy of fungi(L)	Dr. Ik-Hwa Hyun Dr. Seung-Hun Yu
14:30 – 15:30	Major symptoms of fungal diseases(L)	
15:30 – 17:30	Importance and identification of <i>Alternaria</i> species (L/PT)	
18:30 - 20:30	<i>Welcome Party</i>	

Day-2 (Nov. 12, 2014)

Time	Session	Facilitator
Session 2: Field Trip		
09:00 – 17:00	Field trip (on-site practice for fungal diagnosis and collection of diseased plant material)	NPC of Cambodia, Dr. Ik-Hwa Hyun Dr. Seung-Hun Yu

Day-3 (Nov. 13, 2014)

Time	Session	Facilitator
Session 3: Lecture (2)		
08:30 – 10:30	Fungal herbarium techniques (L/PT)	
10:30 – 11:30	Isolation and Incubation of Fungi(L/PT)	Dr. Ik-Hwa Hyun Dr. Seung-Hun Yu
11:30 – 12:00	Plant Diseases Caused by Fusarium in Thailand	Dr. Apirusht
12:00 – 13:30	Lunch	
13:30 – 15:30	Importance and Identification of <i>Bipolaris</i> species (L/PT)	Dr. Ik-Hwa Hyun Dr. Seung-Hun Yu
15:30 – 15:50	Coffee Break	
15:50 – 16:50	Importance and Identification of <i>Curvularia</i> species (L/PT)	Dr. Ik-Hwa Hyun Dr. Seung-Hun Yu
16:50 – 17:50	Importance and Identification of <i>Fusarium</i> species (L)	

Day-4 (Nov. 14, 2014)

Time	Session	Facilitator
08:30 - 09:30	Importance and Identification of <i>Colletotrichum</i> species (L)	Dr. Ik-Hwa Hyun
Session 4: Discussion Session		
09:30 – 11:00	- What are main fungus diseases with country concern (either existing diseases for exporting commodities or potential risk of introduction) - List of current or potential domestic technical supporting resource agencies for the surveillance and identification concerned.	
Session 5: Training Assessment		
11:00 - 11:30	- Appraisal on workshop implementation - Expertise test	Project Coordinator
Session 6: Closing		
11:30 – 11:50	Closing remark	Project Coordinator

(L): Lecture, (PT): Practice Training

Annex 2, Participant list

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