No.: 105/NAMCSSTC/VI/2021

Date: 15th of June, 2021

Programme Activity Report: Online Training Course on Principals and Applications of Integrated Pest and Disease Management in the Tropics, 29th to 30th of April, 2021

List of Trainers/Facilitators (*alphabetically sorted*):

Dewi Melani, S.Si, MP

Mrs. Dewi Melani has four years of experience providing training on integrated pest and disease management, sustainable agriculture, and farming entomology. She holds a BA in Biology and Master's Degree in Crop Sciences/Plant Protection. She is now teaching at the Indonesian Centre for Agricultural Training of Ketindan, Ministry of Agriculture Republic of Indonesia. She is trained to cultivate soybeans and train of trainers. She published scientific journals and books on bio-pesticides, farm entomology, pest and disease management and agricultural ecology.

Dr. Juniawan, S.P., M.Si.

Dr. Juniawan has been a staff of the Ministry of Agriculture Republic of Indonesia for more than 30 years. He holds a bachelor's degree in agriculture, a master's degree in dryland agricultural systems and a PhD in plant pest and disease. He is now teaching at the Indonesian Centre for Agricultural Training of Ketindan. He has published scientific papers on clove leaf oils inhibition testing, biological fertilizer testing and fruit fly dynamics in horticultural areas.

Lutfi Tri Andriani, SP., MP.

Mrs. Lutfi Tri Andriani has 11 years of experience providing training on sustainable agriculture, plant disease, plant pathology, integrated pest and disease management agroecosystem. She holds a Master's Degree in Plant Sciences. She is now teaching at the Indonesian Centre for Agriculture Republic of Indonesia. She published scientific journals and books on ecological control of plant pest organisms and usage of plant growth promoting bacteria.

Dr. Md. Mokter Hossain

Dr. Mokter Hossain has 20 years of experience lecturing academics on high quality soil planting, stress physiology of vegetable crops, post-harvest storage technology in fruit and vegetable crops and collection, preservation and evaluation of minor fruit and

vegetables. He holds an M.A. in horticulture and a Ph.D. in agriculture. He also took a post-doctorate from Chinese University of Hong Kong. He now teaches at the Faculty of Agriculture, Bangladesh Agricultural University. He is also affiliated with several leading organisations including International Society of Minor Fruit, Medicinal Plants and Aromatic Plants and the Japanese Society for Horticultural Science. He has published more than 65 scientific journals on banana production, plant growth, and other fruit science and technology topics.

List of Countries (*alphabetically sorted*):

No	Country	Number of Person(s)
1.	Bangladesh	1
2.	Cambodia	2
3.	Fiji	2
4.	India	1
5.	Indonesia	2
6.	Malaysia	2
7.	Nepal	2
8.	Solomon Islands	10
	Total	22

Distribution of Participants' Background

No	Background	Percentage
1.	Government	63.64%
2.	Higher education institution	31.82%
3.	Private sector	4.54%

Programme Activity Report

Online Training Course on Principals and Applications of Integrated Pest and Disease Management in the Tropics, 29th to 30th of April, 2021

Background

The Non-Aligned Movement Centre for South-South Technical Cooperation (NAM CSSTC), in collaboration with the Ministry of Agriculture – Republic of Indonesia and Bangladesh Agricultural University were holding an "Online Training Course on Principals and Applications of Integrated Pest and Disease Management in the Tropics" (the "Training") from 29th to 30th of April 2021.

Integrated Pest and Disease Management (IPDM) is a means of carefully considering all available techniques for pests and plant diseases control and of integrating suitable actions that prevent the development of pests and plant diseases and other interventions into economically justified levels and minimise risks to human health and the environment.

The Training focuses on ecologically based IPDM, integrated tactics in pest management, crop protection issues, and disease management of agriculture plants.

Experts from the governmental and higher education institutions in the field of IPDM were present at the Training. For training purposes, a wide range of digital methods were used, including e-learning, video conferencing and virtual simulations.

The Training included a number of government officers and actors involved in plant protection work from Bangladesh, Cambodia, Fiji, India, Indonesia, Malaysia, Nepal, and Solomon Islands.

Participants further improved understanding and knowledge on: i) the urgency of agro ecosystem ecology as a basic element of integrated pest management; ii) the challenges in botanical pesticide development; iii) post-disease soil rehabilitation; and iv) the application of the management of crop rotation.

Discussion

<u>How to Encounter Pest</u>

Climate crisis in general, has affected the environment, as well as insect reproduction. The insects will find the best environment they can live in. Since climate crisis can change their habitat, insects are driven to migrate to the best spot to live. So, in unusual plants or places people find some sort of unusual category of pests today.

Therefore, it is very important to encounter climate crisis and avoid more ecological challenges to crop production, like pests and diseases.

Existence of pests in plants has affected the food production. To interfere the development of populations of pests, integrated pest management could be implemented. It is also preventing harm to human health, the environment, and the economy.

A way to implement integrated pest management could be to implement the Plant Growth Promoting Bacteria (PGPB). The main function of PGPB is to prevent the attack by pest before applying pesticide. Furthermore, PGPB prevents pre-assault bacterial wilting, thus reducing the risk occurs from it.

Mostly, bamboo is the source of PGPB but *mimosa pudica* (a sensitive plant) also consists of microorganism that produces PGPB. Although this plant is classified as a susceptible crèche, the rhizosphere located in its roots can be taken as PGPB without affecting the leaves.

Promotion of the Use of Botanical Pesticide

As a result of the economic and environmental considerations, botanical pesticide have been frequently used by the farmers since 2016. We cannot however compare the action of synthetic and botanical pesticides in order to ensure its effectiveness. The mechanism of these two types of pesticides works is different.

On the basis of Indonesian Centre for Agricultural Training (ICAT) Ketindan's research there are no specific particles that are toxic to human beings in a botanical pesticide. As the particle can easily be degraded, it will not become a residue for plant and human.

Botanical pesticide supports the diversity of the soil mechanism, the use of this type of pesticide is genuinely safe and even increases the soil mechanism. It is easy to make home-made botanical pesticide so long as it has a strong aroma and bitter taste.

Awareness of farmers is the main challenge facing the development of botanical pesticides. Other efforts need to be made to socialise the importance of its use. It must be stressed that botanical pesticide costs less than the synthetic one, so as long as we have a better understanding of this natural pesticide, if we rely on the economic principle, especially for farmers, they would prefer to use it.

In order to improve plant health, antibiotics can also be used in addition to the use of botanical pesticide. Farmers can use *trichoderma* or beneficial microorganisms in the soil in order to produce special antibiotics. The plants or some of their parts can be reused for planting new plants once the antibiotics have appeared.

Protection from Post-Harvest Diseases

Both pre-harvest and post-harvest are important for crop protection management. Since pre-harvest and post-harvesting, there are some diseases which have to be prevented. It cannot be denied, moreover, that the use of chemical products is still required for certain steps, but as the IPDM is introduced, the IPDM could save more farmers.

The question of potato management dominates the session on post-harvest disease protection with numerous problems facing post-harvest phase. According to the discussion, most common insecticide use is not necessarily effective for weevil control. Weevil should be directly controlled on the ground. As Weevil lives in the plant (hidden), insecticide will not barely kill them. Crop rotation is therefore the best way to be combined with the use of healthy planting materials that are free from diseases.

Stem cuts are usually used in planting materials for planting potatoes, although it must be known that the good stem should be made from good plants.

If we keep the potato in a storage, by picking the best and most selective seeds we can protect against post-harvest diseases because some seeds are more damaging when kept in a more secluded zone.

Evaluation

By the end of the event, 6 random participants attended survey by the organisers. Survey results are as follows (*vide* Chart 1):

- 76.7% of respondents said the training comply with the country's policies;
- 90% of respondents said the training was relevant with the current's development issues;
- 93.33% of respondents said the training was significant for their works;
- 83.33% of respondents said the training met their expectation;
- 73.33% of respondents said the contents were well arranged and easy to follow;
- 73.33% of respondents said the training's curriculum were very specified;
- 86.7% of respondents said the training's goals was fulfilled;
- 86.7% of respondents said their level of knowledge were growing up;
- 90% of respondents said the trainers were keeping them engaged and interested;
- 70% of respondents said the training time allocation was enough; and
- 70% of respondents said the management of the Zoom Webinar was convenient.

Based on the above results, 81.2% respondents found that the training was very impressive.

Conclusion

The organisers draw the following conclusion across the training organisation:

- The participants have acquired knowledge on ecological IPDM, integrated control tactics for pests, protection issues in post-harvest and management of diseases in agricultural plants.
- Microorganism, as long as they are treated correctly and concisely, can help farmers with pest and other plant diseases.
- To preserve the environment and minimise the effect of climate crisis, today's farming needs to be made more green.

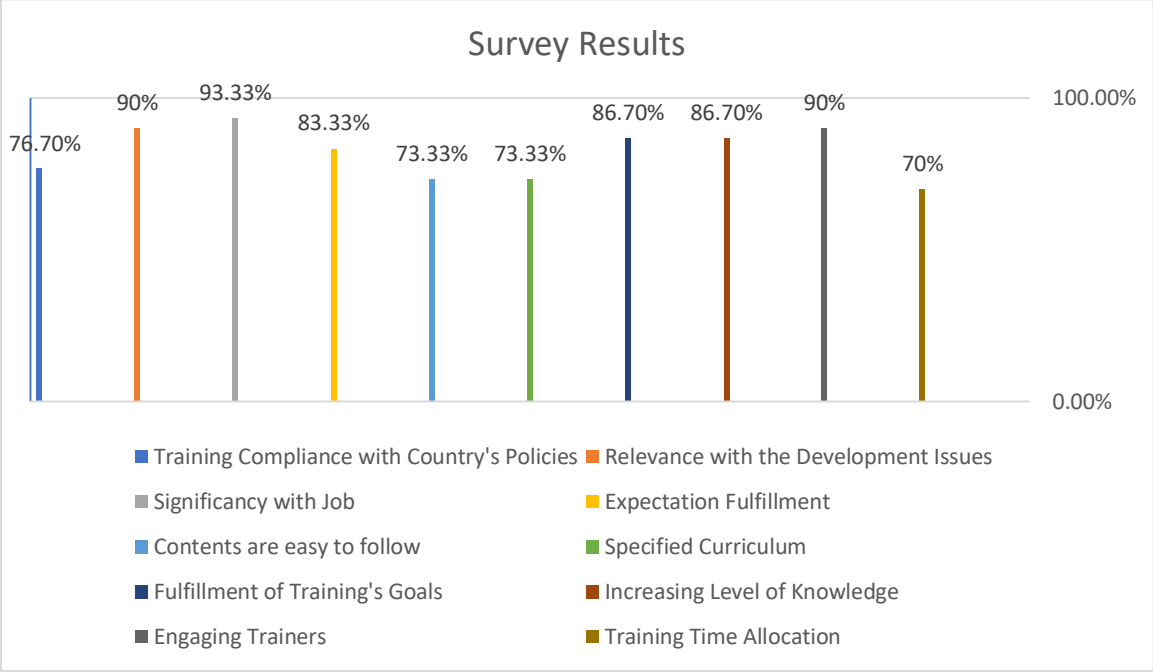

Chart 1. Survey Results

https://entomology.ca.uky.edu/

Insect Pest Characteristic

To classify insects become pest is determine by the Mouthparts:

1. Piercing sucking : a beak through which liquid food is ingested, example: hemipteran, homoptera, thrips
2. Biting/ Chewing: mandible act as jaws, example: grashoppers, beetles, termites, larval moths

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2) Mango stone weevil
(*Cryptorhynchus mangifera*)

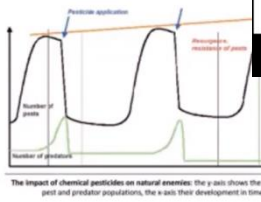
Control measures:

- Preharvest field sanitation
- Use of fruit bagging technology
- Use of pheromone traps

CHEMICAL CONTROL

Chemical control reduces a pest population through the application of pesticides.

The decision to use a pesticide as part of an IPM program should be based on a scouting program, pest identification, economic thresholds, and the crop/pest life stage. When used properly, pesticides provide effective and reliable control of most pest species. Pesticides are considered curative, and generally should be used as a last resort.



The impact of chemical pesticides on natural enemies: the y-axis shows the size of the pest and predator populations, the x-axis their development in time.

Figure 8. The impact of chemical pesticides on natural enemies
https://teca.apps.fao.org/teca/en/technologies/8372

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