

Feed the Future: Innovation Lab for Integrated Pest Management Trip Report

Country(s) Visited: Ethiopia

Dates of Travel: July 16-22, 2018

Travelers' Names and Affiliations:

1. Ibrahim Hashim (Sokoine University of Agriculture), Tanzania
2. Zuwena Eliamini (National Biological Control Program -Kibaha), Tanzania
3. Martin Maganga (Sokoine University), Tanzania

Purpose of Trip: Training Workshop on Production and Use of Bio-control agent, *Trichoderma* and Plant Growth Promoting Rhizobacteria

Sites Visited: Addis Ababa

Description of Activities/Observations:

Day 1 (17 September 2018) we conducted a workshop at Kaleb Hotel, Addis Ababa, Ethiopia. The workshop was opened by Dr. Tadele Tefera (Country head ICIPE-Ethiopia and Project Leader for Rice, Maize and Chickpea IPM East Africa) and invited participants from Kenya, Tanzania, Ethiopia and India (resource persons) to introduce themselves.

After the introduction, each participant was asked to give out his/her expectations for this training workshop. Among of them were; to gather knowledge and skills on biocontrol, mass production, preservation and packaging of bio-agents, how to integrate the bio - agent with other methods, regulations of bio-agents, challenges associated with the use of bio-agents and networking.

Dr. Tadele Tefera introduced the objective of the Training Workshop and gave a brief overview of the Grain IPM Project for East Africa. He also said that in the past, the same

training was conducted in Arusha, Tanzania and trained participants from Ethiopia, Tanzania and Kenya. With the slight changes from past training, the current training workshop is aimed to train plant pathologists only by considering that new pests come every day and there are no experts. It is expected that the trained pathologist would go and work on bio-agent related activities.



Dr. Tadele Tefera listing down participants' expectations during the inaugural session

Dr. Belay from Ethiopian Institute of Agricultural Research (EIAR) presented, An overview of *Trichoderma* research and production in Ethiopia. In his presentation he pointed out that currently in his institute they have managed to collect some isolates of *Trichoderma* and conducted in vitro and Screenhouse evaluations. He listed several publications conducted in Ethiopia on the efficacy of *Trichoderma* for management of different crop diseases. What is lacking is knowledge/skills on mass production,

preservation, packaging and marketing of *Trichoderma*. This training workshop came at the right time where these skills are needed. In Kenya, the awareness of using bio-control agent is higher than Tanzania. However, when compared to Ethiopia, Kenya is still behind on bio-agents research. This is similar to Tanzania and the main challenge reported was the lack of a well facilitated laboratory in the Government research institutes.

After presentation from Ethiopia, Dr. Gadhi Karthikeyan and Dr. Nakkeeran (resource persons) respectively presented on introduction and prospect of *Trichoderma* as biocontrol agents and preparation of nutrient media and isolation of *Trichoderma* and plant growth promoting rhizobacteria (PGPR) from Rhizosphere. The aim of these presentations was to give hands-on experience to participants on isolation and identification of *Trichoderma* and PGPR from rhizosphere and rhizoplane.

Day 2 practical session lead by Dr. Gandhi Karthikeyan and Dr. Nakkeeran on selection and mode of action of *Trichoderma* and PGPR, Mass production and delivery system of *Trichoderma*, *Pseudomonas* and *Bacillus* and Invitro screening and bio-efficacy of *Trichoderma* and *Pseudomonas*.

Day 3 practical session on field selection and collection of plant roots and laboratory isolation of *Trichoderma*, *Pseudomonas* and *Bacillus*. The important factor to consider during collection of roots is the stage of growth of crop plants. The best plant growth stage for collecting roots is the stage before the late vegetative stage. In this stage the rhizosphere has diverse microbes due to abundant root exudates. Heathy and vigorous growth roots were selected and taken to the laboratory for isolation of *Trichoderma* and PGPR.



Practical session: Dr. Nakkeeran (holding uprooted spinach plant) explaining to participants when and how to select suitable plant roots for isolation of *Trichoderma* and Plant Growth Promoting Rhizobacteria

In the practical session on the formulation and packaging of bio-agents, we learned that bio- agents such as *Trichoderma* can be prepared as a liquid or powder formulations similar to pesticides. Depending on type of formulation, packaging can be done with plastic bottles or transparent plastic bags. We learned that a well formulated and packed bio-agent can be stored and stay effective for 8 – 12 months.



Practical session on formulation and packaging of bio-control agents. Dr. Nakkerean holding a well packed powder formulated *Trichoderma*.

Day 4 we had a presentation session on quality control of biocontrol agent and registration of *Trichoderma* and *Pseudomonas* the case of India. Dr. Nakkeran gave an experience of India on the registration processes of biocontrol agents. The difference between India and Ethiopia, Tanzania and Kenya is that after registration of biocontrol agent there is a specific period to follow up the registered product and review its registration. This is important to avoid introduction or change of product in the market.

September 22, 2018, we travelled back to Dar es Salaam and thereafter to Morogoro, Tanzania. In general, the Training Workshop was well organized and conducted. We all shared our experiences and we learned a lot from each other and we enjoyed our stay in Addis Ababa.

Training Activities Conducted: NA

Program type (workshop, seminar, field day, short course, etc.)	Date	Audience	Number of Participants		Training Provider (US university, host country institution, etc.)	Training Objective
			Men	Women		
Workshop on production and use of bio-control agent, Trichoderma and plant growth promoting rhizobacteria	16 -22 Sept 2018	16	14	2	ICIPE, IPM IL	Review current research on selection, mode of action, mass production, formulation and packaging of bio-control agents

Suggestions, Recommendations, and/or Follow-up Items:

- To have strong networking between 3 countries, Ethiopia, Kenya and Tanzania which will help in initiating a regional project on biocontrol agents
- Bio-agents are slow acting thus need extensive demonstration to farmers in their small portion of land; when they see good results, they will use it
- After this training workshop, Ethiopia Agricultural Research Institute planned to establish an incubation center for training farmers
- In Kenya the plan is to start demonstrating bio-agents to organic farmers.

- In Tanzania, we plan to start a collection of isolates and test them on crops such as tomato, paper, cabbage and onions that are now heavily sprayed with synthetic pesticides
- This is training of trainers; go and train your colleagues in your institute/country
- Our countries are rich in bio-diversity; where possible we can use Msc students to collect and test them



Dr. Sevugapperumal Nakkeeran (left side) and Dr. Gandhi Karthikeyan (far right) resource persons during the Workshop

List of Contacts Made:

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