

Feed the Future Innovation Lab for Integrated Pest Management Trip Report

Country(s) Visited: Kenya

Dates of Travel: 21 Feb to March 2, 2019

Travelers' Names and Affiliations: Tadele Tefera

Purpose of Trip: The objectives of the trip were:

To organize and hold training on FAW biological control at icipe Kenya.



Group picture of participants taken on Feb 24, 2019

Activities and observation:

Feb 21-23, 2019: Pre-training

I trained lab assistants (Faith, Ben, Josphat, Josephine) on how to assist the trainees; prepared lab activities/session, brief manuals, insect specimens and lab supplies for the trainees.

Day 1: Monday, Feb 25, 2019

The training covered the areas indicated below; 15 national partners drawn from Ethiopia, Kenya, Tanzania, South Sudan and Cot'divore attended the training. The trainees were university professors, senior scientists, junior scientists, extension agents, and lab technicians. The training started by welcoming remarks by Tadele; Tadele introduced to the trainees objectives and scopes of the training and distributed to the trainees pre-test questionnaires against which the trainees would evaluate themselves at the start and end of the training.

Day 1 covered status of the fall armyworm (FAW) in Ethiopia, Kenya and Tanzania regarding damage and control practices. Series of presentation were made by national partners. The objectives of day one was to understand status of FAW in East Africa, and to assess potential biological control agents against FAW.

Day 2 & 3: Tuesday and Wednesday

Before the start of the lab, I gave the group a brief explanation on what they are going to do during each lab session followed with demonstration by lab assistants. The participants were divided into 4 groups, each consisting of 4 individuals. Each group was given a lab session that lasted for 3-4 hours with detailed exercise. Day 2 (Tuesday) and day 3 (Wednesday) covered various ranges of laboratory practices. Participants were introduced to lab policy and safety precautions before they started doing anything in the lab. The laboratory hands-on practical training included the following specific topics and to each topic was assigned each group for 3 to 4 hrs.:

1. Mass rearing FAW using artificial diets

Mass rearing of FAW is required as some of its natural enemies depend on the host (FAW) number. The lab practice covered mass rearing of FAW using artificial diets and this included: sorting diet ingredients, media preparation and dispensing, inoculation of diets with first instars neonates. The training also included rearing FAW using the natural host maize and FAW eggs collection and sterilization, larvae collection and pupae collection from soil.

2. Mass rearing the Mediterranean flour moth or mill moth (*Ephestia kuehniella*) a factitious host for *Trichogramma*

The purpose of multiplying mill moths is to multiply the egg parasitoid *Trichogramma* sp on factitious host *E. kuehniella* eggs. This included rearing *E. kuehniella* in a lab for colony establishment as well as rearing *E. kuehniella* for *Trichogramma* mass production. This lab session included selection of natural diets of mill moth (cereal bran), inoculation

of diet with egg or larvae, collection of pupae, oviposition site preparation, sexing the moths, egg harvesting and egg cleaning.

3. Mass rearing the egg parasitoid *Trichogramma* on mill moth eggs for field release

This part covered sexing *Trichogramma* wasps, exposing the eggs of mill moth to *Trichogramma* wasps, preparing glue cards, pouring the eggs to cards, preparation of honey solution for the wasps, release of *Trichogramma* to the eggs glued to the card, removal of exposed cards, labelling and incubating the parasitized eggs.

4. Mass rearing the egg parasitoid *Telenomus remus* on FAW eggs

This session covered collection of FAW eggs from 5-6 weeks old maize into rearing jars, examining egg masses for parasitism using hand lens, sexing the wasps, exposing FAW eggs to the wasps, incubating the exposed eggs at room temperature for about 10 days to observe for *T. remus* adult emergence.

5. Mass rearing the larval parasitoid *Cotesia icipe* on FAW larvae

The trainees were exposed to *Cotesia* cocoons, they collected the cocoons into jars/vials separately by cutting leaves, observed for adult *C. icipe* emergence, introduced honey solution into the jars or vials for adult feeding. They transferred 2nd instar FAW larvae to a cage (second instars are preferred by this parasitoid), introduced fresh maize leaves inside the cage for larvae to feed, introduced about 10 pairs of *Cotesia icipe* into the cage using aspirator for about 200 FAW larvae, exposed them for 24 hrs during which the larval parasitoid, *Cotesia icipe*, stung/oviposited into the FAW larvae. Collected the stung larval instars 24 hrs. after exposure and kept them in a lunchbox, provided them with fresh maize leaves and changed the leaves after a day.

Day 4, Thursday Feb 28, 2019

I took the trainees to Mwea, about 105 km from Nairobi. In Mwea, maize (4 weeks old) was planted under farmer's management condition and not sprayed. Peter Malusi, Malick Ba, and I demonstrated to the trainees how to field release egg parasitoids including *Trichogramma* and *Telenomus*. The trainees were grouped into four and practiced site selection and field measurements before release. Each group was given Tricho card with *Trichogramma* pupae and exercised field releases at several points along the maize farm. They also practiced identifying FAW eggs under field conditions, understood FAW

damages to plants, collected FAW eggs and parasitoid cocoons for lab examination and emergence of natural enemies.

Day 5, Friday March 1, 2019

In the morning, the trainees were allowed to exercise any lab session they wanted to do again; they also made observation to eggs exposed to *Trichogramma* and *Telenomus*; they mounted specimens under microscope and examined the differences between male and female *Trichogramma* and *Telenomus*, using their antenna and genitali.

In the afternoon, the trainees were given criteria to evaluate the training, whether they achieved their expectation or not; they were divided into 4 groups, were given an hour to evaluate the training followed by 10 min presentation regarding their evaluation reports. After all presentations were made, general discussion was held, and the training was finally closed by awarding certificate of recognition to each trainee.

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

Feedback from the trainees:

- The training was timely and useful
- The training was successful, first practical training on FAW biological control
- The trainers are qualified and knowledgeable
- The specimens and lab sessions were very practical and to the standard
- They acquired new skills and knowledge
- They suggested to prepare manuals / protocols with more details on how to rear the natural enemies
- Suggested to prepare videos, color plate and pocket guide to enable trainees to be trainers

List of trainees

No.	Names of Participants	Country
1.	Ferdu Azerefegne	Ethiopia

2.	Girma Demissie	Ethiopia
3.	Abeba Biazen	Ethiopia
4.	Muluken Gofishu	Ethiopia
5.	Abel Edmund	Tanzania
6.	Musa Paul	Tanzania
7.	Nsami Elibariki	Tanzania
8.	Zuwena Eliamini	Tanzania
9.	Patrick Likhayo	Kenya
10.	John O Wandenje	Kenya
11.	Joseph Mutunga Mulwa	Kenya
12.	Peter Kamau Njuguna	Kenya
13.	Koffi Eric Kwadjo	Cote d'Ivoire (self-funded)
14.	Ajak Deng Garang	South Sudan (self-funded)
15.	Tracy McCracken	USAID-Kenya (only opening session)