

Field collection and pre-release assessment of parasitoids and predator density

Francis Obala and Samira Mohamed on behalf of Biological Control Group

Organized by



Food and Agriculture
Organization of the
United Nations



icipe

Supported by



EUROPEAN UNION



USAID
FROM THE AMERICAN PEOPLE



Implemented by

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

Outline



❖ Purpose of field collection

1. Survey and cataloguing of potentially effective natural enemies of FAW
2. Initiation of laboratory colonies of parasitoids and/or FAW using field collected samples

❖ How to do field collection: sampling, packaging and incubation in the laboratory

1. Materials you need for field collection of parasitoids
2. Stages of fall armyworm to sample in the field
3. Collection and handling of FAW larvae in the field
4. Maintaining field samples on natural and artificial diet in the field
5. Incubation of field samples on natural and artificial diet in the laboratory

❖ Pre-release assessment of parasitoids and predator density

1. Determination of parasitoid or predator density



Food and Agriculture
Organization of the
United Nations



Field collection



❖ The aims of collecting field samples include:

- i. Survey and cataloguing of potentially effective natural enemies against a target pest.
- ii. For initiation of colonies i.e., of beneficial insects for augmentative biocontrol strategies.
- iii. Initiation of host insect colonies for mass rearing of biological control agent(s)
- iv. Infusion of lab reared insect colonies.



Food and Agriculture
Organization of the
United Nations



Survey and cataloguing of potentially effective natural enemies of FAW



- Survey for parasitoids and/or predators entails:
 - ❖ Collection of all developmental stages of FAW (egg masses, larvae and pupae)

Different parasitoid species attack different developmental stages.



- Incubation of the collected field samples in the laboratory
- Morphological and/or molecular identification of the emerging insects e.g., parasitoids emerging from egg masses, larvae or pupae.
- Rearing of the recovered insects on the tentatively parasitized/preyed stage e.g., eggs, for at least 3 generations.
- Evaluation of their biology and effectiveness (in terms of parasitism) on target pest and other alternative hosts.



Food and Agriculture
Organization of the
United Nations



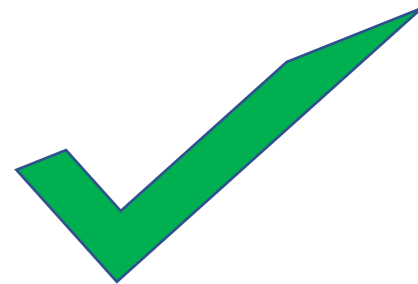
Important detail to consider



- ❖ The maize field(s) selected for sampling should not have been sprayed with synthetic pesticide



Pesticide-free maize field



Field collection for initiation of laboratory colonies of parasitoids or FAW, or Cataloguing of diversity of natural enemies

Some of the field samples to collect



FAW egg mass on maize leaf



FAW larva



Pupa



FAW moth



Chelonus sp. on FAW egg mass



Trichogramma sp. on egg mass



Telenomus sp. on egg mass



Parasitoid cocoon



Food and Agriculture
Organization of the
United Nations



Materials you need for field collection of parasitoids



Plastic jar



Plastic boxes



Plastic bucket



Vials



Perspex cage

- ❖ Cotton wool, paper towel, notebook and pen, cool box and GPS.

Stages of fall armyworm to sample in the field



- ❖ For initiation of FAW colonies, field collected samples of egg, larvae and adults (male and female), can be sampled.



FAW eggs



FAW Larvae



Pupa



FAW moths



Collection and handling of FAW egg masses in the field



FAW egg mass on maize leaf



FAW egg mass in the vial

- ❖ In the maize fields, FAW egg masses are found on either sides of the maize leaves
- ❖ Section of maize leaves with egg masses should be cut and placed separately in the vials and capped with cotton wool, paper towel or any other “capping material that allows for aeration but prevents neonates/larvae from escaping.



Food and Agriculture
Organization of the
United Nations



Collection and handling of FAW larvae in the field



Parts plant for collection of larvae



FAW larva



FAW larvae in plastic box



FAW egg mass in the vial

- ❖ Larvae can be found on the leaves, tassel, husk and silk
- ❖ To remove the larvae from the plant, use either a soft camel hair-brush or soft pair of forceps.
- ❖ In a plastic lunch box lined with paper towel, first place fresh leaves and then introduce the larvae as you sample.



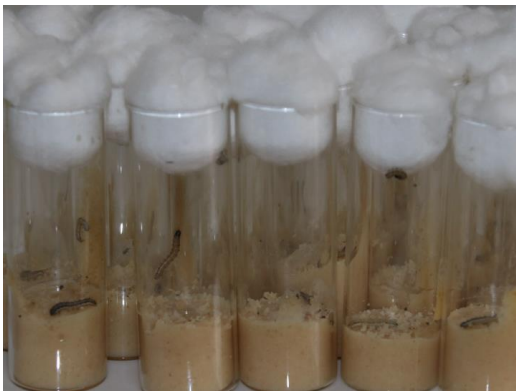
Food and Agriculture
Organization of the
United Nations



Maintaining field samples on artificial diet in the field



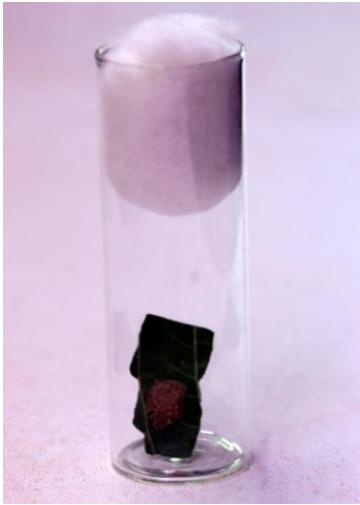
Neonates placed in plastic jars with artificial diet



Glass vials with artificial diet holding FAW larvae

- ❖ Field collected larvae of FAW should be placed in glass vials containing artificial diet and maintained at ambient temperature
- ❖ In each vial, place only 1 FAW larvae (to prevent contamination and cannibalism)
- ❖ FAW eggs collected from the field should be placed in jars with artificial diet

Maintaining field samples on natural diet in the field



Eggs in vials and neonates in a plastic jar

- ❖ Eggs should be placed in vials and upon hatching, neonates should be transferred into jars and fed with fresh clean (pesticide-free) maize leaves

- ❖ Collected larvae should be separated according to larval stages

- ❖ Early larval/late larval instars should be maintained on pieces of fresh clean (pesticide-free) maize leaves placed in plastic buckets or boxes



Plastic box or buckets for maintaining collected larvae



Food and Agriculture
Organization of the
United Nations



Maintaining field samples on natural diet in the field



Plastic bucket

- ❖ Collected larvae should be separated according to larval stages
- ❖ Early larval/late larval instars should be maintained on pieces of fresh clean (pesticide-free) maize leaves placed in plastic buckets or boxes



Plastic boxes

- ❖ Eggs should be placed in plastic jars and upon hatching, neonates should be fed with fresh clean (pesticide-free) maize leaves



Food and Agriculture
Organization of the
United Nations



Collection and maintenance of FAW moths



Using a vial to trap FAW moths in the field

- ❖ FAW moths are usually found in between the leaves and the stems, and whorls.
- ❖ Moths are sampled using insect sweep nets or vials, and placed in Perspex cages, fed with honey and moistened cotton wool, and provided with maize leaves or wax paper for egg laying.
- ❖ Ensure that only FAW moths are sampled, and mix males with females



Food and Agriculture
Organization of the
United Nations



Processing of field collected samples



Natural diet

Artificial diet



Place the pieces of maize
leaves with eggs mass in
plastic jars



Place the FAW larvae in
bucket with leaves

Place eggs mass in plastic jars



Place FAW larvae in vials with artificial
diet (should be 1 larva/vial)



Incubation of field samples on natural and artificial diet in the laboratory



General requirements for the incubation of field samples on natural and artificial diet in the lab



- ❖ Perspex cages for holding moths;
- ❖ Plastic jars for maintaining eggs and neonates
- ❖ Plastic boxes/buckets for maintaining larvae
- ❖ Glass vials for rearing larvae on artificial diet
- ❖ Natural host plant (maize) or artificial diet
- ❖ Incubation of field samples on natural diet should be done in Perspex cages, plastic boxes/buckets or vials
- ❖ The use of artificial diet in the lab requires:
 - ❖ Fresh artificial diet in vials
 - ❖ One larvae should be placed per vial



Food and Agriculture
Organization of the
United Nations



Incubation of samples using natural diet



FAW Larvae reared on maize leaves



Perspex cages for incubation of larvae

- ❖ Samples from the field should be maintained (at 25 ± 2 °C; RH 70 ± 10 ; 12H:12D photoperiod) based on the developmental stage i.e.
- ❖ First and second instar larvae maintained on pesticide-free fresh maize leaves in plastic boxes
- ❖ Third-sixth instars larvae maintained on pesticide-free fresh maize leaves in plastic buckets, Perspex cages or individual vials



Food and Agriculture
Organization of the
United Nations



What to look out for



- ❖ Wasps emerging from parasitized egg masses
- ❖ Cocoons or pupae forming from parasitized larvae
- ❖ Adults parasitoids emerging from formed cocoons and pupae
- ❖ Adults emerging from FAW pupae (in cases of larval-pupal parasitoids e.g., some flies)
- ❖ Moths (FAW) emerging from formed pupae



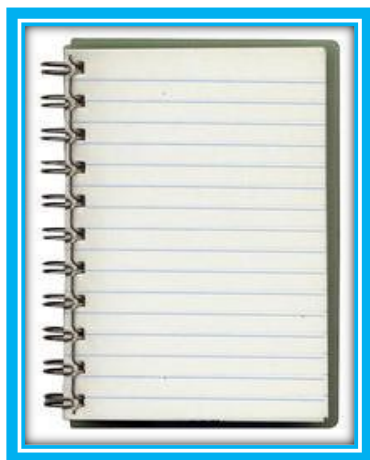
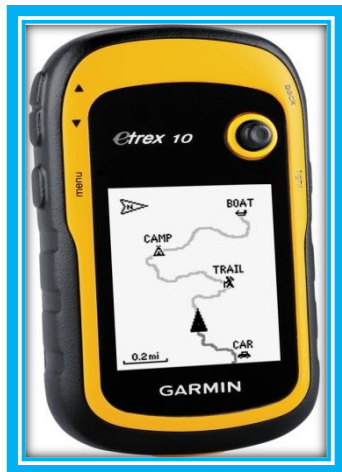
Food and Agriculture
Organization of the
United Nations



Pre-release assessment of parasitoids



Materials/equipment required for field release



- ❖ Tape measure
- ❖ Transporting plastic jars with egg cards
- ❖ Marking cloth pieces
- ❖ Envelopes for hanging egg cards
- ❖ Marking sticks
- ❖ Marker pen
- ❖ Stapler and Pins
- ❖ Meter and rope
- ❖ Stickum or grease

Pre-release of egg and larval parasitoids in the field



❖ Assessment for:

- ❖ Farmers' knowledge on natural enemies; and train them accordingly
- ❖ Use of synthetic pesticides in target fields
- ❖ Level of FAW infestation in the field and the host stage (egg/larva/adult)
- ❖ Presence of the natural enemies (which parasitoids are present?)
- ❖ Stage of the crop
- ❖ Distance between the rearing facility and the field for transport of either cocoons or wasps



Synthetic pesticides used by farmers in Kenya



Assessing farmers knowledge and training



Stage of the crop and level of damage



Food and Agriculture
Organization of the
United Nations



Pre-release assessment of the maize field



- ❖ The target field **SHOULD NOT BE SPRAYED** with synthetic pesticides prior to, during or after the release of the parasitoids
- ❖ At this stage, the techniques for collection of field samples for parasitoids and FAW should be adopted
- ❖ **Additional data to collect:**
 1. Field level parasitism of the various species of parasitoids (Calculated as the percentage of parasitized larvae or egg masses divided by the total number of collected samples (egg masses or larvae).
 2. Diversity of the parasitoids in the target fields.



Food and Agriculture
Organization of the
United Nations



Farmers' awareness





Thank you

Organized by



Food and Agriculture
Organization of the
United Nations



Supported by



USAID
FROM THE AMERICAN PEOPLE



Implemented by

