N°= 3

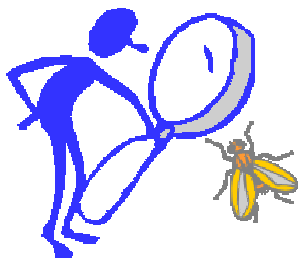
Fruit fly detection trapping in orchards

Background

Fruit flies (Diptera Tephritidae) severely damage important fruit crops, especially mangos. They have become a major economic hazard as a result of their quarantine insect status and the extent of crop loss recorded in West Africa.
To detect their presence in orchards, trapping is a practical and effective method. It permits monitoring of fluctuations in the populations of these pests throughout the year. Pest management campaigns can also be planned at the most suitable time. Many types of trap or bait are available on the market. We present here the best combinations of traps and bait, having tested 8 types of trap and over 10 types of bait in Benin.

Main objective

Detection trapping of males and females of the fruit fly species that damage mangos, guavas, cashew apples and citrus fruits.



Targeted species

Ceratitis spp., *Bactrocera* spp., *Dacus* spp.

Main fruit crop

Mango (Anacardiaceae)

Other fruit crops

Cashew nut (Anacardiaceae), guava (Myrtaceae), citrus fruits (Rutaceae)...
NB: We mention other fruit crops because several species of fruit fly that attack mangos, also live off these other fruit species.

CHOICE OF SITES (example of mango orchard)

The orchards selected to harbour about 10 traps need to meet the following requirements :

- Surface area of at least 6 ha of grafted and currently productive mango trees (at least 15–20 years old).
- Presence of at least 3 marketable cultivars in the orchard.
- Regular spacing between the individual mango trees.
- A farmer committed to using no pesticides.
- Absence of any other crop in the vicinity (cotton…) requiring insecticide treatment.
- Presence of a full-time orchard guard.
- Easily accessible orchard (by motor vehicle if possible)
- Selection of at least 3 orchards corresponding to these requirements per agro-ecological area.

IMPORTANT PRELIMINARY MEASURES

- Simple weather monitoring instruments should be placed in each orchard before installing the traps : thermo-hygrometer recording apparatus, pluviometer.
- Identification of all mango cultivars.
- Map of orchard indicating each cultivar.
- Positioning of each trap on the map.
- Plot the GPS position for each orchard.

SETTING UP THE TRAPS

1. Recommended combination of traps and bait (Vayssières et al., unpubl.):

- For dry traps containing sexually-attractive baits (parapheromones), attracting mostly males, the best trap-bait combination is : parapheromone baits (MET, TER, TRI…) + **TePhriTrap traps** (TPT) **(Photo 1).**
- For liquid traps containing food baits (protein hydrolysates…) attracting mostly females, the best trap-bait combination is: food bait (TOR, NUB…) + **McPHail traps** (MPH). **(Photo 2).**

NB: Some immature males can be trapped using this method.

Photo 1: TPT

Photo 2: MPH

-The bait used in dry traps consists of cylinders of Terpinyl acetate (TER), of Methyleugenol (MET), of Trimedlure (TRI), of Cuelure (CUE)…, or 3C sachets (3 components)…

-The bait used in liquid traps consists of hydrosoluble Torula pastilles (TOR), or mixtures based on protein hydrolysates such as Nulure + Borax (NUB)…

2. Trap density required per ha for detection trapping

- Dry traps: average proposed density is 1 to 2 parapheromonal traps (MET, TER, TRI…) per hectare, placed at least 40 metres apart to avoid any interaction between the baits.
- Liquid traps: average proposed density is 2 food bait traps (TOR, NUB…) per hectare, placed at least 30 metres apart.

3. Setting up the bait

- Dry traps: cylinders of Terpinyl (white), Methyleugenol (sometimes blue or green) and Trimedlure (sometimes red), packaging removed, are placed in the baskets at the top of the traps to optimise diffusion and remain attractive even if a large number of insects lie at the bottom of the traps. Cubes or rectangular sheets of yellow insecticide (DDVP) are placed at the bottom of the traps.
- Liquid traps: 3 or 4 Torula pastilles (one per 100 ml of water), are plunged into water; the MPH traps are then filled with water. A sheet of insecticide (e.g. DDVP) is placed in the basket suspended at the top of the trap.

4. Mapping

- All the traps should be numbered and located on a precise map of the orchard (GPS plotting), as well as the mango tree cultivars.
- Plants and trees on the borders of the orchard should be indicated, with their names (if they are known).

5. Location in the host tree

- Traps should be suspended in the host mango trees **(Photo 3)**, on branches in the lower third of the foliage; they should be hung within human reach.
- It is important to avoid hiding the trap in the foliage, thus facilitating entry for the fruit flies.
- The traps should not be in direct sunlight; a shady location should be found, especially for the liquid traps.

NB: It is essential to coat the central coil of wire holding up the trap with thick grease, in order to prevent any predatory activity **(Photo 4)** on the part of weaver ants (*Oecophylla longinoda*) regarding the dead fruit fly adults (in this case several *Bactrocera invadens* captured by ants in the bottom of the trap).

Photo 3

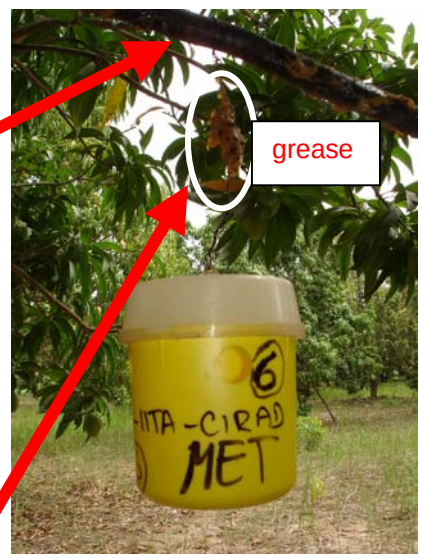


Photo 4

Regional Control Fruit Fly Project in West Africa

1.Collection :

- The captured flies **(Photo 5)** in each trap are counted, removed with tweezers, and preserved in small containers containing alcohol (70°).
- The flies recovered from liquid traps are placed in a small sieve and then washed in water before being removed with tweezers and placed in ad hoc containers containing alcohol (70°).
- These containers should be labelled twice (outside and inside) in black indelible pen resistant to alcohol.
- The labels must show the following information : name of site, date of removal, trap identification number, the number of flies captured and the attractant used.

Photo 5

- The total number of fruit flies captured in each trap should be entered on a daily spreadsheet for the entire orchard (with technician's name).
- The various Tephritidae species will be determined thereafter in the laboratory using appropriate magnifying equipment and documents.

NB: The IITA-CIRAD "Mango Fruit Flies" research unit will be happy to confirm these classifications, and/or to identify the species which could prove more difficult !

2.Change of bait and insecticides :

- Dry traps: the cylinders of Methyleugenol, Terpinyl acetate and Trimedlure should be changed every month. This also applies to the 3C sachets.
- Liquid traps: the hydrosoluble Torula pastilles and the Nulure Borax mixture should be renewed each week after careful washing of the trap, and fresh water placed in the lower third of the trap.
- DDVP sheets: insecticides should be changed once a month in both types of trap. Even though they can remain effective for up to 5 or 6 weeks, it is recommended to change them every 4 weeks to obtain the best results.

3. Disposal of refuse

- Used bait and insecticides should be put in a refuse container and removed (to avoid, among other drawbacks, biasing the results relating to capture in the traps).
- Any leftover Torula mixture should be buried in the ground.

Authors : Jean-François Vayssières* and Antonio Sinzogan

*CIRAD, UPR Production fruitière, Montpellier, F-34398 France; IITA, Cotonou, Bénin.

Layout : Alliance Tossou

For further information : Jean-François Vayssières. Tel: +(229) 21 35 01 88 /e-mail: j.vayssieres@cgiar.org