## Fruit flies and damage on mango

Mango is a strategic crop with an export market estimated at 279 million USD in 2020, a value that has quadrupled since 2016. The Mekong Delta alone produces half of Vietnam's mangos.

Oriental fruit flies (Bactrocera dorsalis and related spp.) routinely destroy 20-30 % of marketable yields in monitored orchards. When unmanaged, some outbreaks can lead to 80% losses.

This pest pressure has a double impact: (1) it reduces the value of mango harvests, and (2) it reduces access to premium markets (USA, Japan, Australia) because of quarantine concerns.

Biology of Fruit Flies

Eggs laid in healthy fruits

Larval instars

Pupae

Adults (20-30 days)
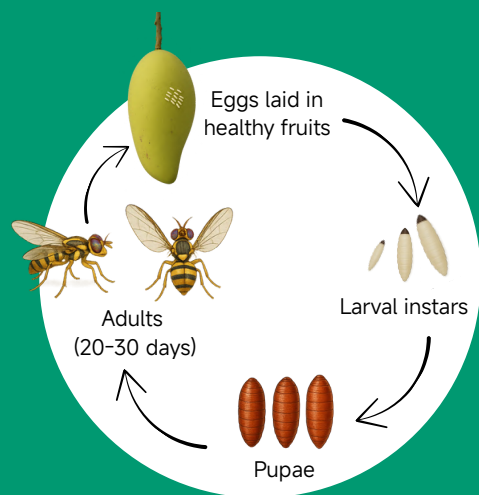
ACP to manage fruit flies

Agroecological Crop Protection (ACP) focuses on working with nature to manage pests like fruit flies by enhancing ecological processes rather than relying on synthetic chemicals.

What is an Augmentorium?

The augmentorium is a netted structure (tent or cage) used to confine fruits that have been infested by fruit flies. It prevents adult fruit flies from escaping while allowing beneficial parasitoids, which destroy the fruit flies, to get in and out. It is both a waste management tool and a biological control.

Structure of the Augmentorium

Minimal size for an augmentarium is a cube at 0.6 x 0.6 x 0.6 m. This size can be increased depending on the volume of fruit waste.

Net

Tent canvas

Side opening (zip or flap) to insert fruits

Costing (VND)

- Frame:
  - Net — 52,000
  - Water pipes — 18,000
  - Pipe connectors — 40,000
- Base: plastic or concrete lining to prevent fly pupation in soil — 35,000

Total: 145,000 (~USD5.5)
Cost per hectare (5-10 units): 725,000 – 1,450,000

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Agroecology and Safe Food System Transitions

A TECHNICAL GUIDE:
AUGMENTORIUM FOR THE MANAGEMENT OF FRUIT FLIES IN MANGO PLANTATIONS

3 FUNCTIONS OF AN AUGMENTORIUM

1. SANITATION OF FRUIT FLIES

The first and most important function of the augmentarium is to prevent next infestations by avoiding emerged pests to escape.

2. BIOLOGICAL CONTROL

At the same time, the augmentarium enhances biological control by allowing wild smaller beneficial insects to enter, attack the trapped fruit flies in the augmentarium and exit again through the net.

3. FACTORY FOR COMPOST

Finally, the augmentarium contributes to fertilization as the damaged fruits can be turned into compost once the fruit flies are dead.

Benefits
- Reduces fruit flies without chemicals
- Enhances natural enemy populations
- Promotes community-wide pest management

Challenges
- Workload: damaged fruits need to be collected and placed in the augmentarium manually.
- The augmentarium is affected by environmental conditions.

STEP 1: COLLECT SOURCES OF INFESTATION

Break the reproduction cycle!
- Collect dropped or visibly infested fruits at regular intervals, for example during harvesting or field visits.
- Regular collection is important as infested mangos that have fallen to the ground can contain up to 200 fruit fly larvae. These must be confined before the next generation of fruit fly escapes.
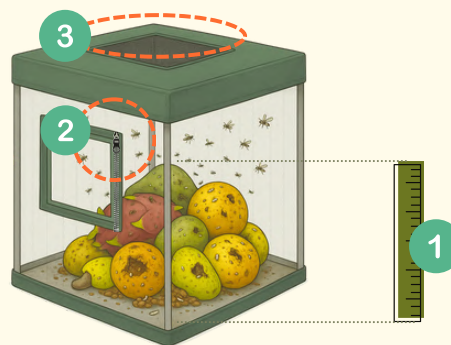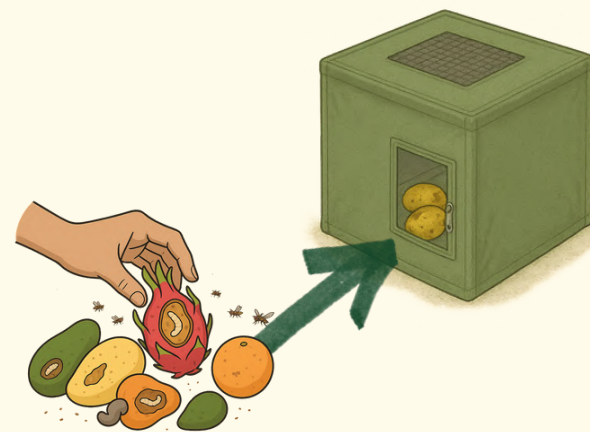
Recommendation: There should be between 5 to 10 of augmentariums per hectare.

STEP 2: THROW INTO AUGMENTARIUM

Deposit damaged fruits in the augmentarium through the opening
1. Avoid piling fruits too high to allow air circulation.
2. Close the augmentarium well to prevent fruit fly escapes.
3. Allow natural enemies to emerge: Parasitoids escape through the mesh vents while fruit flies are trapped inside.

STEP 3: DISPOSE OF COMPOST MATERIAL

Produce compost after 30-50 days
- This agroecological crop protection approach allows you to produce your own compost from the content of the augmentarium. The compost is ready after around 30 to 50 days.