

Suggestion on Trapping Systems for fruit flies' Surveys in Sri Lanka

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● Purposes of trapping

● Sentinel for exotic fruit flies/Point of entry

● PFA Maintain for fruit flies

● Protocol requirement

● Others



●1 Develop trapping plans

Develop a national fruit fly surveillance plan and
Develop an emergency action plan for exotic fruit flies.

--- **Technical Guideline for Fruit flies trapping**

--- **Technical Guideline for emergency action plan of exotic Fruit flies**

2-1

● Attractants and lures

● Male-specific/
para-heromone

Trimedlure
(TML)



Ceratitis spp.
(*C.capitata* , *C. rosa* , ***



Methyl eugenol
(Me)



Bactrocera spp.
(*B. dorsalis*, *B. zonata*, *B. carambolae*, *B. musae* , ***)



CUE lure (Cue)



Bactrocera spp. and
Zeugoducus spp.
(*B. trynoi*, *Z. cucurbitae*, *Z. tau*)



2-1

● Attractants and lures



**Female-biased/
Food (Odours)
attractants**

Liquid protein
(PB)



Anastrepha spp, or Rhagoletis spp.



Other food-
based synthetic
attractants

Several food-based synthetic attractants (3C,2C, ***)
have been developed using ammonia and its derivatives



Table 2. Major fruit fly species of economic importance and their attractants

Scientific Name	Attractant
<i>Anastrepha fraterculus</i> (Wiedemann)	Protein attractants (PA)
<i>Anastrepha ludens</i> (Loew)	PA, 2C ¹ attractant
<i>Anastrepha obliqua</i> (Macquart)	PA, 2C ¹ attractant
<i>Anastrepha striata</i> (Schiner)	PA
<i>Anastrepha suspensa</i> (Loew)	PA, 2C ¹ attractant
<i>Bactrocera carambolae</i> (Drew & Hancock)	Methyl eugenol (ME),
<i>Bactrocera caryeae</i> (Kapoor)	ME
<i>Bactrocera correcta</i> (Bezzi)	ME
<i>Bactrocera dorsalis</i> (Hendel) ⁴	ME
<i>Bactrocera invadens</i> (Drew, Tsuruta, & White)	ME, 3C ²
<i>Bactrocera kandensis</i> (Drew & Hancock)	ME
<i>Bactrocera occipitalis</i> (Bezzi)	ME
<i>Bactrocera papayae</i> (Drew & Hancock)	ME
<i>Bactrocera philippinensis</i> (Drew & Hancock)	ME
<i>Bactrocera umbrosa</i> (Fabricius)	ME
<i>Bactrocera zonata</i> (Saunders)	ME, 3C ² , ammonium acetate (AA)
<i>Bactrocera cucurbitae</i> (Croquillet)	Cuelure (CUE), 3C ² , AA
<i>Bactrocera cucumis</i> (French)	CUE, PB
<i>Bactrocera trivoni</i> (Froggatt)	CUE
<i>Bactrocera tau</i> (Walker)	CUE
<i>Bactrocera latifrons</i> (Hendel)	PA
<i>Bactrocera citri</i> (Chen)	PA
<i>Bactrocera tsuneonis</i> (Miyake)	PA
<i>Bactrocera minax</i> (Enderlein)	PA
<i>Bactrocera oleae</i> (Gmelin)	PA, ammonium bicarbonate, Spiroketal

<i>Ceratitis capitata</i> (Wiedemann)	Trimedlure (TML), Capilure, PA, 3C ² , 2C ³
<i>Ceratitis cosyra</i> (Walker)	PA, 3C ² , 2C ³
<i>Ceratitis rosa</i> (Karsh)	TML, PA, 3C ² , 2C ³
<i>Dacus ciliatus</i> (Loew)	PA, 3C ² , AA
<i>Myopardalis pardalina</i> (Bigot)	PA
<i>Rhagoletis cerasi</i> (Linnaeus)	Butyl hexanoate (BuH), ammonium salts (AS)
<i>Rhagoletis pomonella</i> (Walsh)	BuH, AS
<i>Toxotrypana curvicauda</i> (Gerstaecker)	2-methyl-vinyl-pyrazine (MVP)

¹ Two-component (2C) synthetic food attractant of ammonium acetate and putrescine, mainly for female captures

² Three-component (3C) synthetic food attractant, mainly for female captures (ammonium acetate, putrescine, trimethylamine).

³ Two-component (2C) synthetic food attractant of ammonium acetate and trimethylamine, mainly for female captures.

⁴ Taxonomic status of some listed members of the *Bactrocera dorsalis* complex is uncertain.



● 2 Trapping Areas

- For Detection survey:
 - Ports of entry of imported fruits and vegetables and their circumjacent area.
 - Fruit markets and their circumjacent area.
 - Other places or sites, which could pose as sentinel for exotic fruit flies.
 -



● 3 Trap density

For detection/monitoring
of
target fruit flies

1-2 traps/Km²

For eradication

1-12 traps/Km²

For delimiting

20-50 traps/Km²



●4 Trapping season

Based on biology of fruit flies, the trapping season is determined according with the monthly mean temperature:

$T \geq 15 \text{ } ^\circ\text{C}$, should be trapped.

$T \leq 10 \text{ } ^\circ\text{C}$, should not be trapped.

$10^\circ\text{C} \leq T \leq 15 \text{ } ^\circ\text{C}$, should be trapped if necessary.

- **Trap types (most widely used)**



Modified multi-lure trap (dry)



Modified Multi-lure trap (wet)



multi-lure trap



Steiner trap



Jackson trap



Mcphail trap





● 5 Required Field Equipment

Following equipment available during routes to service traps adequately, depending on the type of trap being serviced:

Long bar or stick with a hook at the end and a rubber hanger to handle the traps

Tweezers of different sizes

Field markers, pencils, and pens

Knives

Hand lens or magnifying glass

Trapping report

Vials with 70% alcohol

Dry vials

Large plastic bags

Trays to carefully transport the materials

Hand sanitizer

Paper towels

Dark glass bottles



6 Trap fix

- Multi-lure trap (modified)





6-1 Multi-lure trap with Methyl eugenol (Me) or CUE Lure

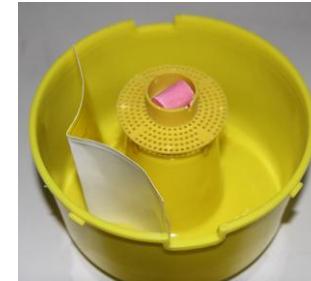
- Insert/Fix the holder
- Put in the cotton-ball/wick
- Add Me or CUE lure (with Malathion as killing agents) 3-4 mL into the Cotton ball
- Cover up the two parts





6-2 MMulti-lure trap with TML

- Insert/Fix the holder
- Put in the plug
- put in sticky plate as killing agents
- Cover up the two parts





6-3 MMulti-lure trap with PB

- Add clean water 600-650 mL
- put in 6 tablets of PB (protein Borax) in water.
- Put in sieve holder
- Cover up the two parts





Introduction of the use of MMulti-lure trap (modified)



综合型诱蝇器使用方法简介



适用于液体诱剂

装上小隔网，放入棉团，加入3-4 mL诱剂（如桔小实蝇诱剂ME或者瓜实蝇诱剂CUE）



适用于固体诱芯

装上小隔网，加入诱芯（如地中海实蝇诱芯TML）放入撕开的粘蝇纸



适用于饵剂

加入600-700mL的清水，投入饵剂6粒（如蛋白诱饵PB），放入大隔网



安装上盖

装盖，使上盖和底座的预留口对齐，以留入口



安装上盖

装盖，使上盖和底座的预留口错开，保持密闭



贴上标签，挂上挂钩



借助伸缩竿将诱蝇器挂到合适的位置



7 trapping procedures

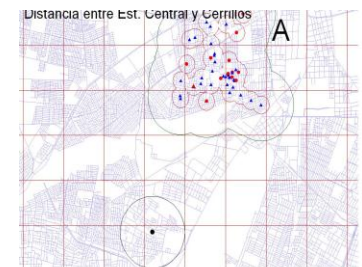
1) Layout of trapping

Traps are normally distributed in the trees that provide access to host material.

The primary host with material fruits is the first choose.

In production places, traps will be placed in areas where can cover whole places.

In some areas where hosts exist, traps are usually deployed in a way which may have a uniform distribution depend on the intrinsic characteristics of the area.





7 Trap procedures

2) Trap placement

The traps **should be** deployed in the middle to the top part of the host plant canopy, depending on the height of the host plant, selecting semi-shaded spots and usually on the upwind side of the crown.

Other suitable trap sites are resting and feeding areas in plants that provide shelter and protect flies from strong winds and predators.

Traps **should not be** exposed to direct sunlight, strong winds or dust. It is of vital importance to have the trap entrance clear from twigs, leaves and other obstructions such as spider webs to allow proper air flow and easy access for the fruit flies.

Placement of traps in the same tree baited with different attractants should be **avoided** because it may cause interference among attractants and a reduction of trap efficiency.



7 Trap procedures

3) Trap re-
location

Traps have to be relocated following the maturation phenology of the primary fruit hosts

4) Density of traps

For the detection of the concerned fruit flies, the density of traps is often one trapping site per square kilometer. In the high risk area, two trapping sites should be set per square kilometer. Each trap site usually includes 4 traps (1 traps for Me, Cue, TML and PB, respectively).

5) The frequency
of check trap

For the detection of the concerned fruit flies, all traps should be checked in the frequency of twice a month.



The frequency and methods of rebaiting and maintain of traps see the following table

Common name	Acronym	Formulation	Field longevity ¹ (weeks)	Survey programme			
				Monitoring/Detection		Delimiting	
				Inspection ² (days)	Service (re bait) (weeks)	Inspection ² (days)	Service (re bait) (weeks)
Para-pheromones							
<u>Trimedlure</u>	TML	Polymeric plug	4-10	7-14	6-10	2-3	4
		Laminate	3-6	7-14	4-6	2-3	3
		Liquid	1-4	7-14	2-4	2-3	1
<u>Methyl eugenol</u>	ME	Polymeric plug	4-10	7-14	8-10	2-3	4
		Liquid	4-8	7-14	6-8	2-3	4
<u>Cuelure</u>	CUE	Polymeric plug	4-10	7-14	8-10	2-3	4
		Liquid	4-8	7-14	6-8	2-3	4
<u>Capilure</u> (TML plus extenders)	CE	Liquid	12-36	7-14	12-26	2-3	12
Pheromones							
<u>Papaya fruit fly</u> (2-methyl-vinylpyrazine)	MVP	Patches	4-6	7-14	5-6	2-3	4
<u>Olive Fly</u> (spiroketal)	SK	Polymer	4-6	7-14	5-6	2-3	4
Food-based attractants							
<u>Torula yeast/borax</u>	PA	Pellet	1-2	7-14	2	2-3	1
<u>Protein derivatives</u>	PA	Liquid	1-2	7-14	2	2-3	1
<u>Ammonium acetate</u>	AA	Patches	4-6	7-14	5-6	2-3	4
		Liquid	1	7-14	1	2-3	1
		Polymer	2-4	7-14	3-4	2-3	2
<u>Ammonium (bi)carbonate</u>	AC	Patches	4-6	7-14	5-6	2-3	4
		Liquid	1	7-14	1	2-3	1
		Polymer	1-4	7-14	3-4	2-3	1
<u>Ammonium salts</u>	A	Salt	1	7-14	1	2-3	1
<u>Putrescine</u>	Pt	Patches	6-10	7-14	8-10	2-3	6
<u>Trimethylamine</u>	TMA	Patches	6-10	7-14	8-10	2-3	6



The frequency and methods of rebaiting and maintain of traps see the following table

Table The frequency and methods of rebaiting and maintain of traps

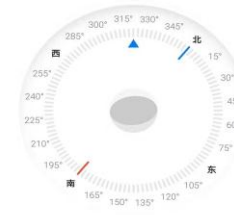
Lures	Dosage of first time	Interval of rebaiting	Method of trap service
TML	1 piece	Monthly	Change the lure and sticky plate
ME	3 mL - 4 mL	Monthly - add; two-month - change	Add 2 mL - 3 mL, after two month change the cotton and lures
CUE	3 mL - 4 mL	Monthly - add; two-month - change	Add 2 mL - 3 mL, after two month change the cotton and lures
PB	600mL - 650mL water and 6 pieces PB	Two weeks*	Add 600mL - 650mL water and 6 pieces of PB after clean the trap

*In dry season, more frequency may need



8 Mapping of trap location

西北 325°



北纬 25°56'24" 东经 117°54'13"





9 Trap servicing and inspection

- Remove the trap;
- Gently use tweezers to remove flies and place them in properly labeled vials containing alcohol 70%;
- Rebait trap and replace toxicants according to procedure and **interval recommended** on product label;
 - [**Interval can range from one day up to 30 days.
 - **Rebait-to avoid spillage or contamination of the external surface of the trap body or the ground.
 - **The trap should be replaced when the glass/plastic is very dirty;]
- Take vials to *** authorized laboratory for identification within 24 hours of collection;
- Document activities and maintain records.



More information on FTD



Thanks for your attention
Q & A ?