

THE SOUTH AFRICAN MANGO GROWERS' ASSOCIATION

GUIDELINES FOR MANAGEMENT OF FRUIT FLIES.

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Andre Botha – Subtrop

1. FRUIT FLY SPECIES OF IMPORTANCE

Oriental fruit fly, *Bactrocera dorsalis* (previous known as *Bactrocera invadens*)

Natal fruit fly, *Ceratitis rosa*

Cape fruit fly, *Ceratitis quilicii*

Mediterranean fruit fly, *Ceratitis capitata*

Marula fruit fly, *Ceratitis cosyra*

2. INTRODUCTION AND DISTRIBUTION

All the fruit flies of importance that pose a threat to the mango industry are indigenous to South Africa except the Oriental fruit fly that is of Asian origin. The Mediterranean and Cape fruit flies are widely distributed across South Africa, but the Cape fruit fly tend to have lower numbers in dry areas. The Natal fruit fly occurs in the Northern parts of the country, while the Marula fruit fly can be found in the north-east and east coast of South Africa.

In the subtropical areas it seems that the Oriental fruit fly is the dominant species. The pest free areas for Oriental fruit fly currently include the Free State, Northern and Western Cape.



Mediterranean fruit fly

Image: <http://www.photomacrography.net/forum/viewtopic.php?t=12521>



Marula fruit fly

Image: <http://projects.bebif.be/fruitfly/>



Cape fruit fly

Image: <http://www.outdoorphoto.community/gallery/showphoto.php?photo=363302&title=natal-fruit-fly&cat=548>



Natal fruit fly

Image: <http://www.outdoorphoto.community/gallery/showphoto.php?photo=363472&title=natal-fruit-fly&cat=548>



Oriental fruit fly

Image: <http://projects.bebif.be/fruitfly/>

3. MONITORING IN THE ORCHARD

Monitoring of fruit flies first allows one to know which species are present as well as the numbers and the timing / efficacy of control measures implemented. Compliance to Global GAP standards requires proof of monitoring measures for all the different types of fruit fly species. Pest monitoring is important for compliance with GLOBAL GAP standards. In order to obtain a removal permit from the Department of Agriculture, Forestry and Fisheries for the movement of fruit from areas where Oriental fruit fly is present to a pest free area, evidence of monitoring and suppression must be provided. In areas where the Oriental fruit fly is absent, it is essential to do surveillance for early detection. The minimum required trap density for surveillance is 1 trap per km² or 1 trap per 100 ha, with at least 1 per Production Unit Code.

4. HARVESTING PRACTICES

Mango fruits are usually not infested during the early fruiting period but are markedly more prone to attack closer to harvest. Green fruit is a less suitable host for fruit fly reproduction and regeneration. Fruit that ripens on the tree are more prone to attack than mature green fruit. Therefore, harvesting fruit at the mature green stage rather than leaving the fruit to ripen on the tree will contribute to avoiding high levels of infestation. Fruit that ripens spontaneously on the tree should be harvested as soon as possible. Ripe infested fruit will drop to the ground and the emerging flies will re-infest fruit. It is important to remove all fruit during harvest. Fruit left on trees after harvest can serve as a reservoir for fruit flies to breed. Suppression methods are also stopped after harvest, which will create an ideal environment for breeding of fruit flies which will lead to high population levels.

TRAPS AND LURES FOR *Ceratitis* spp.

Threshold levels for every trap are given. Where threshold levels are exceeded, growers are encouraged to apply chemical control measures for the specific fruit fly species.

A male lure like Capilure can be used for monitoring *Ceratitis* species, including **Mediterranean, Natal, and Cape fruit fly species.**

- Capilure together with a Sensus trap
Threshold level: 3 fruit flies / week

Replace every 6-8 weeks (1 trap every 2ha, after flowering until harvest)

NB: These lures do not attract Marula fruit fly.

Food baits like Questlure and Biolure Fruit Fly attracts both sexes of the **Mediterranean fruit fly, Natal fruit fly, Cape fruit fly and Marula fruit fly.**

- Questlure can be used together with a Sensus trap.
Threshold level: 3 fruit flies / week
- Biolure Fruit Fly can be used together with a McPhail type trap.
Threshold: 7 fruit flies / week

1 trap every 2ha. For farms bigger than 100ha; 1 trap every 5ha.

Dichlorvos containing blocks must be placed in the McPhail type trap and the Sensus trap.

5. TRAPS AND LURES FOR ORIENTAL FRUIT FLY

- Invader-Lure and Chempac ME Lure are male lures and contain methyl eugenol to attract the Oriental fruit fly.
Chempac Bucket-, Lynfield-, McPhail- or Moroccan trap can be used together with methyl eugenol.
Threshold level: Below 3 fruit flies / week

Invader-Lure: Replace male lures every 6 weeks.

Chempac ME Lure: Replace male lures every 8 weeks.

- Biolure Fruit Fly is a food bait and can be used for monitoring females and males of the Oriental fruit fly.
A McPhail type trap can be used with Biolure Fruit Fly.
Threshold level: Must be kept as close to 0 as possible, if any oriental fruit flies are trapped, chemical control measures must be put in place.

Biolure Fruit Fly: Replace food attractant every 6 weeks.

1 trap per 20ha

Dichlorvos containing blocks must be placed in all traps for Oriental fruit fly: Replace every 6-8 weeks.

Link: <https://www.mango.co.za/technical-information/> under Pest Management, Fruit flies.

6. CONTROL

TRADE NAME	ACTIVE INGREDIENT	DOSAGE / 100L	APPLICATION
Last Call FF	permethrin	150 g/ha (3000 drops/ha)	Start applying as soon as fruit flies are observed. It is recommended that traps are placed in the top 2/3 of the tree. Re-apply at 28-day intervals with a maximum of 5 applications per season. Do not treat areas smaller than 5ha.
GF-120 NF	spinosad	5 - 30 L Bait mixture (1 - 1.2 L in 4 - 29 L water)/ha	Apply as a band of scattered coarse droplets, 1 - 4 mm in size, 1 - 2.5 m above ground level. Repeat every 7 - 14 days depending on population pressure. Use mixture within 12 hours. Do not add any other products to this mixture.
M3α	proteinhydrolysate & plant extract + alpha-cypermethrin	300/ha for trees up to 5 m tall / 400/ha for trees > 5 m	Hang bait station 4 weeks before fruit become susceptible to fruit fly attacks. Hang in the shade 3 m above orchard floor. Each bait station will last 4 months.
Cura fly FF 240 FF240 Fruit fly bait	Spinosad	1.0 1.2 L Cura fly in 9 – 29 L water	Apply Cura Fly/FF240 bait as coarse droplets (approx. 1-4 mm on bearing fruit trees and 4 -6 mm on non-bearing fruit trees. Apply a total of 10 to 30 litres baitmixture per planted ha. Use only calibrated equipment adapted to meet the application criteria. Scatter droplets approximately 1 - 2.5 m above ground level to one side of each row of trees. Alternate sides with each consecutive application
Invader- <i>b</i> -Lok™	Methyl Eugenol + Mercaptothion	10 - 12 blocks/ha	Hang each block on the shady side of the tree, 1.5 m high. Replace blocks every 6 - 8 weeks. Disperse evenly. Invader- <i>b</i> -Lok are used to attract the male species of <i>Bactrocera invadens</i> .
Bi-ME Mat blocks	Methyl Eugenol + Mercaptothion	6 - 12 blocks/ha	Bi-ME MAT blocks should be placed as soon as <i>B. invadens</i> is caught in a monitoring trap. Bi-ME MAT blocks should be replaced every 6 weeks. Place

			Bi-ME MAT blocks at a height of about 2 m above the ground.
Avi Gard	Mercaptothion	175 mL + 8 kg Sugar or 200 mL/Protein or 600 g fish oil	Bait treatment: Apply 35-40 L/ha as a coarse droplet spray onto underside of foliage. For small plots, repeat application twice per week. For large plots repeat application weekly and after rain NOT TO BE USED FOR EXPORT
Avi Merkaptotoks	Mercaptothion	300 g + 8 kg sugar or protein hydrolysate at the dosage recommended.	Bait: Apply at weekly intervals to foliage as coarse droplet spray at the rate of 250 mL –1 L mixture/tree when fruit becomes susceptible to attack. Apply in winter to evergreen trees on warm, sunny days to reduce over-wintering population. Repeat after rain. NOT TO BE USED FOR EXPORT
Datathion EC	Mercaptothion	175 mL + 8 kg sugar or proteinhydrolysate as per instruction	Same as above NOT TO BE USED FOR EXPORT
Fenthion Fruitcare Grab 500 EC	Fenthion	100 mL	Apply as two full cover sprays 20 and 10 days before harvest. Use a surfactant to improve spray coverage. NOT TO BE USED FOR EXPORT.
Bioneem	Azadirachtin	2-4 L/ha	Spray weekly. After first 2 sprays, monitor insect pressure and adjust spraying up to 14 day intervals, or as necessary

7. SANITATION

Orchard sanitation entails the regular removal from the orchard and destruction of all fallen fruit. Without good orchard sanitation, the efficacy of treatments directed against fruit flies will be severely compromised. Sanitation contributes towards the reduction of fruit fly numbers, because larvae can crawl out of the fruit and pupate in the soil. In the beginning of the season, sanitation can be carried out weekly, and then twice a week when ripe fruit is present in the orchard. Fruit must be destroyed by burying it below a layer for at least 600 mm of soil or by putting it through a hammer mill. Orchard sanitation also contributes towards the suppression of the mango weevil, *Sternochetus mangiferae*.

Source: Fruit flies – mango production. Tertia Grové. ARC-Tropical and Subtropical Crops.

