In general the application of Good Agricultural Practices and/ or Integrated Pest Management is very important in addressing the Invader fruit fly challenges.

Affected mango
Picture by J.H. Venter

A diversity of Good Agricultural Practices can be applied, which include, trapping, identification, fruit inspection, scouting, fruit cutting, weeding, prompt harvesting, principles of Integrated Pest Management, chemical control and physical control, to manage the fruit flies. Research is under way in different countries regarding the biological control and post-harvest control options.

N.B. Pulping and smashing of fruit is not an effective way to kill off the fruit fly larvae, especially if it is not buried, fed to livestock or exposed to the sun.

6. Socio-economic implications of the Invader fruit fly

- May result in restriction of movement of host fruit and vegetables from quarantine areas, causing a social or cultural practice disruption (stop giving fruit to visitors, relatives and friends from pest infested areas)
- Market bans/restrictions
- Loss of production owing to fruit rot, which will ultimately threaten food security
- High input and post-harvest costs
- Increase in price of fruit and vegetables

7. Legislative implications

- Movement of host fruit and vegetables from infested districts and municipalities is subject to a permit ,e.g. any host fruit and vegetables from the Vhembe district must be accompanied by a removal permit and comply with the conditions of the permit.
- Pest-free areas can be established and maintained by monitoring traps, doing chemical eradication, sanitation and following other possible methods that can suppress the pest.
- A farmer must apply for a removal permit from the Department of Agriculture, Forestry and Fisheries – if granted, based on the compliants with the permit conditions and as a requirement of the permit, a farmer must give a copy to the buyer of host fruit and vegetables from his/her farm. Hawkers and buyers will get a copy of a permit from the farmer and must make sure that the valid period for the permit has not elapsed. The permit is free of charge.

"Together we can do more in combating the fruit flies"

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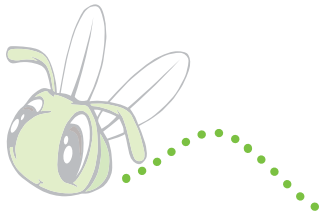


Invader fruit fly (*Bactrocera invadens*) control measures in South Africa

agriculture, forestry & fisheries

Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

1. Description

The Invader fruit fly is a quarantine pest and has been reported on more than 70 host species from 25 plant families in Africa. The hosts include commercial fruit types such as mango, citrus, guava, papaya and bananas, wild fruit such as marula and wild figs, as well as ''vegetables'' such as bell peppers, pumpkin and tomatoes.

The fruit fly can be recognised by a yellow and dark-brown colour with black markings on the thorax. Other characteristics include clear wings with a continuous dark coastal band, two yellow strips on the sides of the thorax and a dark T-shaped marking on the abdomen.

Picture by Bob Copeland

Picture by J.H. Venter

The female fruit fly has an abdomen that is slightly elongated and pointed while in males the abdomen is more rounded.

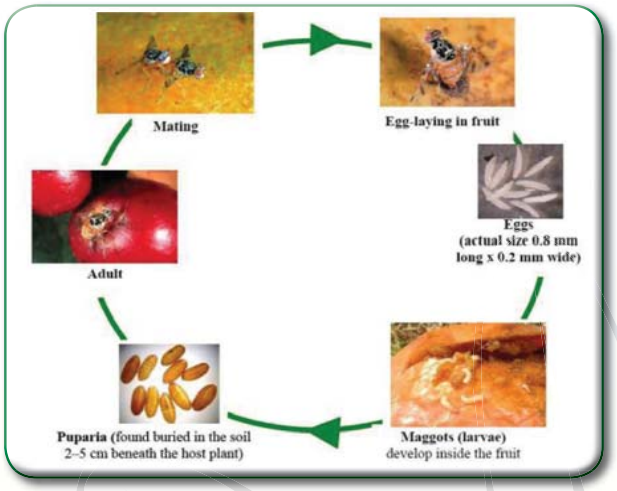
2. Origin and distribution

The invader fruit fly originates in Asia and was first reported in Kenya in 2003 and is currently making its way to most African states, causing major damage to the host fruit and vegetables. Some of the countries from which it has been reported include Benin, Bioko Islands, Burkina Faso, Cameroon, Chad, Comoros, Democratic Republic of the Congo, Ethiopia, Ghana, Guinea, Ivory Coast, Mali, Mozambique, Namibia, Niger, Nigeria, Senegal, Sierra Leone, Sudan, Tanzania, Togo, Uganda, Zambia and Zimbabwe.

It was first detected in South Africa in 2010 in the Northern part of the Limpopo province and was eradicated successfully. It was reported to be present in South Africa in the Vhembe district of Limpopo in March 2013 and its establishment and spread is believed to have been caused by the mango season and the floods encountered in January and March 2013. North West, Mpumalanga, Gauteng and Kwazulu-Natal are some of the provinces under high risk in terms of being invaded by invader fruit fly. It is believed to be spreading from infested areas through people moving with fruit to the non-infested areas as well as through natural movement.

3. Symptoms on affected fruit

Fruit flies cause direct damage by puncturing the skin of the fruit to lay eggs, using their ovipositor. Each female can lay an average of 700 eggs, depending on the host. When the eggs hatch, the larvae feed on the inside of the fruit, causing the fruit to mature prematurely and rot. As the fruit ripens and rots, it falls to the ground and the larvae crawl out and pupate in the soil.



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4. Identification of the pest

- The specimen detected in the orchards or households by means of a trap should be sent to the Department of Agriculture, Forestry and Fisheries for further identification and or verification by the taxonomists who use laboratory techniques.
- Results will be communicated to the client, confirming whether the specimen was positively identified as Invader fruit fly.

5. Control methods

- ***Movement control:*** Farmers, travellers and community members should regularly seek advice on the areas under quarantine and the requirements applicable in case one wants to move fruit from such areas in terms of the Agricultural Pests Act, 1983 (Act No. 36 of 1983 – Control measure R110). No person is allowed to move host fruit from a quarantine area to a non-quarantine area without a permit.
- ***Sanitation through bagging and burying:*** The use of plastic bags by farmers and villagers is highly recommended while other feasible methods are still being investigated. Rotted or unwanted fruit can be put into a plastic bag that must be tightly closed and exposed to the sun at least 3 days or 7 days if the temperatures are below 30 ^{0}C. After being exposed to the sun, the organic waste can be used as compost or animal feed.
- ***In case one does not have a plastic bag*** then the pit method can be applied. The fallen and or rotted host material can be put into a pit and covered with at least a 50-cm layer of soil. No buried fruit may be uncovered for at least five weeks after being buried. Areas underneath the host trees, in orchards and home gardens must always be clean. Leaving fruit piled on the ground for more than a day provides a chance for breeding of pests and/or disease establishment. Alternatively, to destroy larvae inside the damaged fruit the use of farm equipment to pulp or grind the fruit can be effective. The crushed fruit can also be used to supplement animal feed.
- ***Chemical control***: Farmers and villagers can apply the recommended chemicals, which are available from commercial dealers to control the fruit flies . In terms of chemical control, farmers can use the following;
  - MAT blocks with methyl eugenol (hung on the trees at a height of 3 metres)
  - M3 bait stations (hung on trees or poles at a height of 3 metres)
  - Fenthion (as prescribed on the label)
  - Spinosad (as prescribed on the label)
  - Please note that a combination of MAT blocks, Trapping Kit (consisting of bucket traps, methyl eugenol lure or biolure and killing strip), chemical spray and/or bait as well as sanitation is important for fruit fly management.

Check with the Directorate: Agricultural Input Control for any newly registered product. The use of registered and environmentally friendly chemicals is important. The chemicals must be used according to the directions on the labels to prevent damage to the crop, humans and the environment in general.