



Control of fruit flies through phytosanitary hygiene of orchards: prophylactic method



Standards and Trade
Development Facility



Background

Fruit flies are pests of great economic importance due to their quarantine pest status and losses recorded in West Africa in a number of fruit crops. A new species, *Bactrocera invadens*, (Photo 1) which migrated to West Africa from Asia is causing increasing damage to mango production (Photo 2) at regional level. Mangoes, species of *Citrus* and *Annona*, guavas, papayas, sheanut, and other local fruit crops are severely attacked depending on the season and the agro-ecological zones (see Information Leaflet No. 8). All fly stages before adult emergence of fruit flies (Photos 2-3) inside punctured fallen fruits on the ground are vulnerable. **We should also take this into consideration for obtaining successful control.** Regular sanitation activities of these fruits are absolutely necessary to reduce the Tephritidae pest pressure and thereby reinforce the effectiveness of other control methods.

Photo 3:
Larvae & pupae of
fruit flies



Photo 1: *B. invadens* on Cv Eldon



Photo 2: Damage of Tephritidae on Cv Smith

Objectives

Provide all people involved in the fruit production sector with methods to maintain phytosanitary hygiene of orchards **at the beginning of the season**, so that the pressure from Tephritidae species is reduced.

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Methods

Phytosanitary hygiene is maintained through collecting punctured / fallen fruits. The objective is to destroy all fruit fly stages (eggs, larvae, pupae) before adult emergence inside the punctured / fallen fruits. The methods employed include:

- **Burial method:** collected fruits are buried in a hole at a depth of more than 80 cm; fruits are placed in the hole and then covered with a substantial layer of soil (more than 30 cm).
- **Incineration method:** collected fruits are burnt.
- **Bagging and solar heating method:** collected fruits (three times a week) are sealed in black plastic bags and left in the sun for at least 48 hours.

Note: A proven method in Benin as described in this leaflet is the bagging of punctured / fallen fruits in black plastic bags left in the sun. This is the cheapest method of all because it uses less manpower and the bags can be re-used many times as long as they are not damaged. Moreover, the method is effective, efficient and very easy to use.

Description

It consists of (i) gathering punctured or fallen fruits, (ii) placing them in a black plastic bag, (iii) sealing the bag and placing it in the sun. The bag should have been checked to ensure there are no holes. After 48 hours, eggs and larvae of Tephritidae will be killed due to the high temperatures in the bag.

Materials

- Black plastic bags "garbage bags" in perfect condition (Photo 4).
- Labour for collecting the fruit three times a week.



Photo 4: Black plastic bag (garbage bags)

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Different steps

- Damaged and fallen fruits under mango or citrus trees are collected three times a week (Photos 5 a-b).
- Damaged and fallen fruits under other host trees (see **Information Leaflet No. 8**) around the orchards are also collected.
- Place the collected fruits in sealed black plastic bags (Photo 6).
- The black plastic bags are left in the sun for at least 48 hours while the effect of solar heating destroys all eggs, larvae and pupae developing inside the fruits (Photo 6).
- The dried fruits should be disposed of outside the orchard. For instance, these damaged fruits can be used as animal feed or as compost.



Photos 5 a et b: Collection of fallen fruits into black plastic bags

- **Remark:** Once emptied, bags should be cleaned for re-use in later weeks provided they are in good condition (i.e. no holes that could allow fly larvae to escape).



Photo 6: Fallen fruits sealed in black plastic bag and left in the sun

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Recorded data in Benin (2008)

Remark: The treatment here consists of combining the sanitary harvest with the treatment using GF-120 to reinforce the effectiveness of GF-120. Results (number of captured flies and infestation rates) from treated orchards (**Tr**) are compared to those from control (**To**).

Fluctuations in fruit fly populations

➤ Populations of fruit flies in treated orchards (**Tr**) are low throughout the season.

➤ Number of flies per trap and per week is three-fold lower in treated orchards (**Tr**) than in control ones (**To**) (Fig.1).

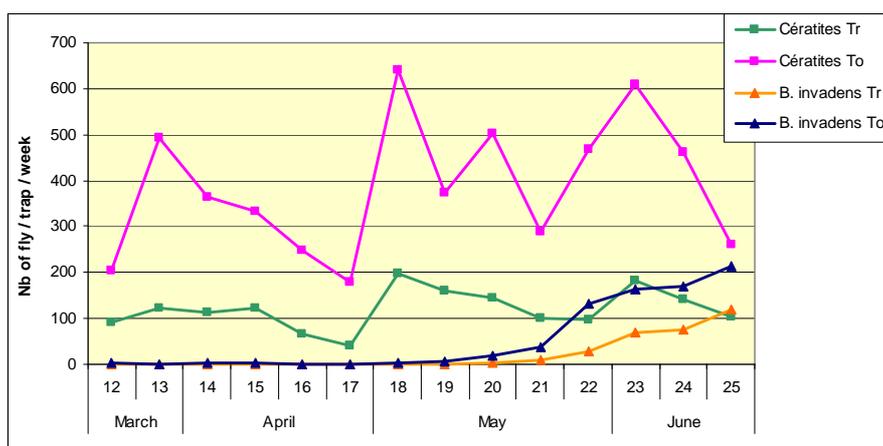


Figure 1: Comparison of fluctuations in male populations of fruit flies (*C. cosyra* and *B. invadens*) captured per trap & per week (2008 season).

Infestation rate

➤ **Integrating GF-120 treatment with sanitary harvest reduces infestation rate by up to 95% (Table 1) in Borgou Department in 2008.** As previously indicated, the rate of infestation of fruit is the only good criterion by which the efficacy of a control method can be assessed. The population level of Tephritidae is not a criterion for assessing efficacy (see leaflet No. 6) of a control method.

Table 1: Comparison of infestation rate (2008)

	Control orchards	Treated orchards = GF-120	Treated orchards = GF-120 + sanitary harvests
Infestation rate (nb pupae/kg of fruits)	33	6	1.5
Treatment impact on infestation rate as compared to control (%)	-	81	95

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