In-Field Management for Oriental Fruit Fly in the Sharwil Avocado Systems Approach for Export

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Trapping Requirements (1)

Trap Type: Yellow bottom McPhail trap

Trapping Timeframe: Trapping must begin one month before harvest and continue through the end of the harvest period

Trap Numbers: A minimum of two (2) traps per place of production are required, with at least one trap per 24 acres.

Trapping Requirements (2)

Trap Bait: Protein bait (attracts both male and female Tephritid fruit flies).

A) Three (3) protein bait pellets in 300 ml water (quarter not needed!); or
B) 30 g of NuLure (10%) + 15 g of borax (5%) added to water to make 300 g solution.

Trapping Requirements (3)

Trap Location: Traps must be placed in avocado trees, at least 4 feet off the ground and nestled within avocado foliage. One trap should be in an avocado tree in a border row of the orchard, and one trap should be within the orchard, preferably near the middle.

Good location

Poor locations:

Too low; no foliage

Height ok; no foliage

Trapping Requirements (4)

Trap Servicing: Traps must be serviced weekly, with recovered fruit flies identified and counted. The bait should be topped off with water to 300 ml at the one week service and replaced with fresh bait at the two week service. In addition to catching Oriental fruit fly, it could also catch melon fly or Mediterranean fruit fly.

Oriental fruit fly

Melon fly

Mediterranean fruit fly

Trapping Requirements (5)

Trap Records: Records of the number of traps, location of traps, and trap catch results must be maintained for one year and made available to APHIS staff on request.

McPhail Trap #	Sharwil Avocado Certified Grove Fruit Fly Trapping & Treatment Record				
Date Installed:					
Week	Service Date	Service Action (replenish /new bait)	Number of Oriental Fruit Flies	GF-120 Treatment Date	Name of Grower:
1					
2					
3					USDA GROVE #:
4					
5					
6					Grower's Phone Contact:
7					
8					

Trapping Requirements (6)

Trigger for Bait Spray Requirement: Average catch of Oriental fruit fly per trap per day should be calculated:

$$\frac{(\text{Catch - trap 1}) + (\text{catch - trap 2})}{(2 \text{ traps}) \times (7 \text{ days})} = \frac{\text{Total Catch}}{14} = \_\_\_ \text{ flies/trap/day}$$

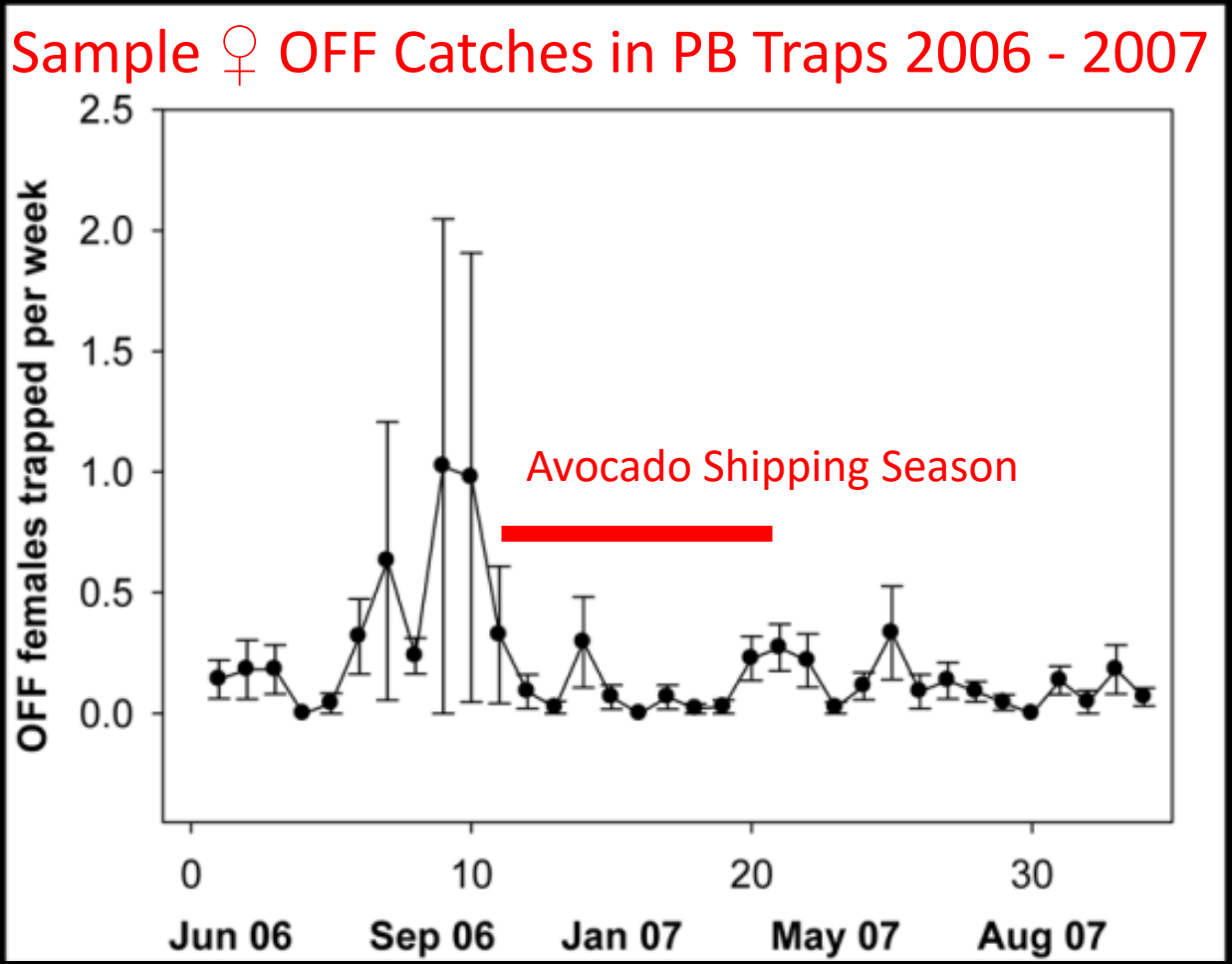
E.g., $$\frac{(1) + (4)}{(2 \text{ traps}) \times (7 \text{ days})} = \frac{5}{14} = 0.36 \text{ flies/trap/day}$$

No spray Needed!!!

If the average catch of Oriental fruit flies for a week > 0.4 flies/trap/day (this will be reached if ≥ 6 flies are caught over the course of one week), then orchard bait sprays must be initiated.

Trapping Requirements (7)

Mean (±SEM) number of oriental fruit fly (OFF) females caught per week in protein bait traps in avocado orchards in Kona, Hawaii, 2006-07 (Data from 18 farms, sampled biweekly for 15 months).



Follett, P. A., and R. I. Vargas. 2010. A systems approach to mitigate oriental fruit fly risk in 'Sharwil' avocados exported from Hawaii. *Acta Hortic.* 880: 439–445.

Bait Sprays (1)

This is an environmentally friendly bait spray. The active ingredient concentration is very low (0.02%) (≤ 0.008%) when diluted with water) and it is listed by OMRI as acceptable for use in organic production.

Bait Sprays (2)

- Apply bait as a spot spray to the underside of the avocado leaves

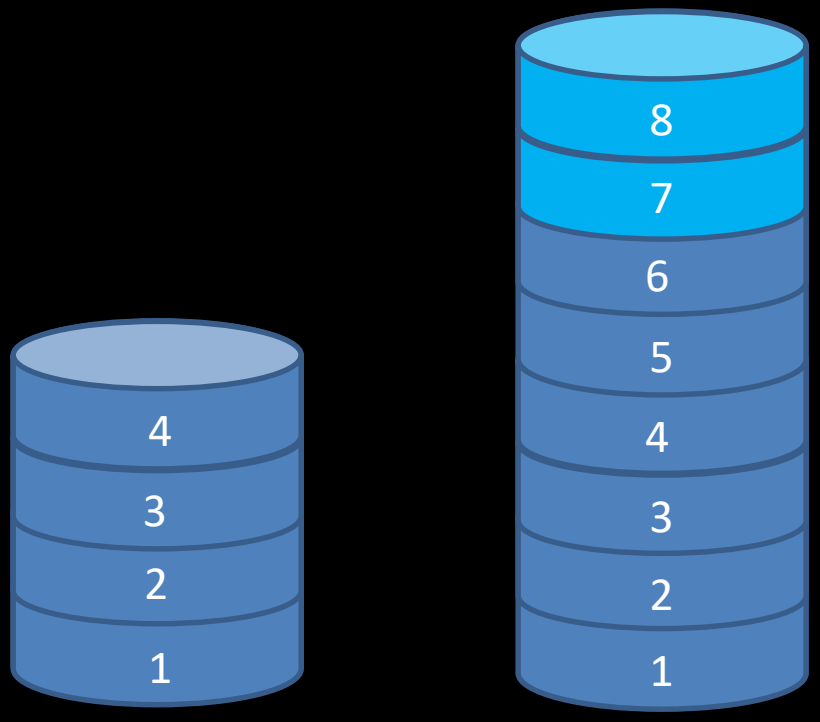
- Apply also under leaves of other Oriental fruit fly host plants within the production area or within ten (10) feet of the avocado production area.

- Where possible, spray spot application should include the underside of upper canopy leaves, because Oriental fruit flies can frequent upper canopy areas.

Bait Sprays (3)

GF-120:

Bait concentrate needs to be mixed with water before use



GF-120 Concentrate
4 parts

Water
6 – 8 parts

Using spot sprays, the product label allows one to apply 30 – 90 ml of undiluted spray solution per tree

Bait Sprays (4)

The GF-120 spray must be repeated at 7-10 day intervals (more frequently during rainy periods) until the fruit fly population drops below 0.4 flies/trap/day, or harvesting is completed for the season.

Sanitation

- All fallen avocado fruits within the certified orchard must be removed, and disposed of in an approved manner, at least once every seven days.

- Other fallen fruits, that are hosts of Oriental fruit fly, must also be removed, and disposed of, throughout the orchard and throughout the area extending 10 feet beyond the orchard.

Sanitation: **Some options for fruit disposal**

Compost: compost pile covered and "working" (> 140°F internal heat).

Animal Feed: but avoid leaving fruit piled on ground for more than a day.

Drowning: fruits must be submerged in water for at least 48 hours.

Bagging: make sure there are no holes in the bags.

Grinding: must be as thorough as a garbage disposal.

Burying: fruits should be buried at least 18 inches deep.

"Augmentorium": Use of a tent-like screen structure designed to retain fruit flies while allowing fruit fly natural enemies to re-enter the farm environment.

Sources of Protein Baits

Torula Yeast Pellets

ISCA Technologies, Riverside, CA
180 pellets (2 lbs.) - $59.90
900 pellets (10 lbs.) - $199.90

Great Lakes IPM, Vestaburg, MI
100 pellets (3 lbs.) - $100.00

Nu-lure Insect Bait

Big Island Sources of GF-120 Fruit Fly Bait

Farm and Garden [$189.00/gal]

Kailua-Kona (329-4775)

Captain Cook (323-3017)

Crop Production Services [$175.00/gal]

Hilo (935-7191)

Value of Sanitation

Helps decrease field Oriental fruit fly population levels:

In plots where no bait spray was applied, the number of adult female Oriental fruit flies captured in protein baited traps increased as sanitation conditions worsened (higher numbers of ground fruit).

Piñero, J. C., R.F.L. Mau, & R. I. Vargas. 2009. Managing Oriental fruit fly (Diptera: Tephritidae), with spinosad-based protein bait sprays and sanitation in papaya orchards in Hawaii. *J. Econ. Entomol.* 102: 1123-1132.

The relative density of male oriental fruit fly adults was lower in orchards where ripe fruits on trees and on the ground were removed twice a week.

Liquido, N. J. 1993. Reduction of Oriental fruit fly (Diptera: Tephritidae) populations in papaya orchards by field sanitation. *J. Agric. Entomol.* 10: 163-170.

Value of Sanitation

Helps decrease fruit infestation levels:

Oriental fruit fly larval infestation (density & percentage infested fruit) was lower in half- and fully-ripe papaya fruits in orchards where ripe fruits on trees and on the ground were removed twice a week.

Liquido, N. J. 1993. Reduction of Oriental fruit fly (Diptera: Tephritidae) populations in papaya orchards by field sanitation. *J. Agric. Entomol.* 10: 163-170.

Value of Sanitation

Reported “Sharwil” avocado Oriental fruit fly infestations:

[will yet provide some data on reported infestations]