Welcome to the HAW-FLYPM team! Our goal is to promote a sustainable suppression program using an “area-wide” approach to managing fruit flies, while introducing environmentally acceptable and cost-effective technologies that address grower needs. Through HAW-FLYPM, we intend to increase economic benefits to growers, the community, and the state of Hawaii through expanded opportunities in diversified agriculture.

We hope that you will use this simple guide to learn about fruit flies and help manage these pests in your farm. Fruit fly suppression can be as simple as 1-2-3: Sanitation, Monitoring and Protein Bait!

### MEDFLY IDENTIFICATION & BEHAVIOR

It’s important to know which species of fruit fly you have in your farm. Incorrect identification can result in ineffective pest control measures.

#### MEDITERRANEAN FRUIT FLY

**Identifiable Traits:**
- “Picture” wings
- Brown bands on wings

*In high elevations, more common at 1000-4000 feet*

**Medfly Behavior**
- Medflies tend to remain within orchards and crop fields. Adult fly behavior is affected by temperature. On cooler mornings, flies warm-up on top of leaves. In warmer temperatures, flies tend to avoid the sun and stay inside foliage. Fruit flies are active from after sunrise to mid-day, up until mid-afternoon depending on the temperature. They usually mate late in the afternoon as the light intensity drops and sleep among the leaves in the evening.

#### GENERAL FRUIT FLY LIFECYCLE

**ADULT STAGE**
- Flies emerge from mature pupae in the morning and become sexually mature in 10-15 days. Once they have mated, females sting produce to deposit their eggs and the cycle begins again.

**EGG STAGE**
- Eggs are deposited by the adult female in the fruit or vegetable. A female medfly can lay 700 eggs in batches of 2-10. Eggs hatch within 48-72 hours.

**PUPAL STAGE**
- In the soil, larvae form a puparium which protects the insect until it develops into an adult.

**LARVAL STAGE**
- Larvae hatch from eggs and tunnel through host fruits and vegetables. Larvae emerge from the fruit and burrow in soil.

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**Hosts**
- Citrus
- Coffee
- Loquat
- Guava
- Peach
- Papaya
- Persimmon

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We're online! Visit us at [www.fruitfly.hawaii.edu](http://www.fruitfly.hawaii.edu) for more information

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FIELD SANITATION
Sanitation is the disposing of infested fruit so fruit fly eggs and larvae do not survive. It is one of the easiest suppression methods, and a very important one for two reasons: 1) An infested fruit may hold hundreds of larvae and/or eggs; by getting rid of that one fruit, you are eliminating future fruit fly swarms, 2) Pesticides applied to fruit do not kill larvae and eggs. Sanitation destroys infested fruit to KILL FRUIT FLIES.

Sanitation Techniques
- Plow the field 1 week after crop harvest
- Bag culls in thick plastic bags
- Bury infested fruit 18 inches deep
- Feed but do not leave leftovers around for over a day

MONITORING TRAPS
Monitoring helps growers make good pest management decisions. Fly catches in monitoring traps not only determine fruit fly populations in the area, but also help reduce the number of flies in your farm area!

The keys to successful monitoring: 1) Correct lure, 2) Good trap placement, 3) Timely trap maintenance

<table>
<thead>
<tr>
<th>Number of Traps</th>
<th>Male Lure</th>
<th>Trap Placement</th>
<th>Trap Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 trap for every 5 trees</td>
<td>Bio-Lure Medfly®</td>
<td>Place traps in or near fruit trees</td>
<td>Hang traps at least a foot off the ground, best at eye level</td>
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<tr>
<td></td>
<td></td>
<td>trap ➔ tree</td>
<td>Replace lures every 2 - 2.5 months</td>
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PROTEIN BAIT SPRAYS
Fruit flies need sugars for energy and proteinaceous food to mature and reproduce. In nature, they turn to nectars (sugar) and bird feces and yeasts (protein). Protein baits attract and poison feeding male and female fruit flies. Such sprays are intended for fruit fly control and are most effective when used with other suppression methods. GF-120 Fruit Fly Bait Concentrate®, a combination of protein bait and spinosad insecticide is very safe to humans. Not labeled as a restricted-use chemical, GF-120 NF is listed for use in organic production.

<table>
<thead>
<tr>
<th>Protein Bait Preparation</th>
<th>Protein Bait Application</th>
<th>Recommended Roosting Hosts</th>
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</thead>
<tbody>
<tr>
<td>GF-120 is designed for low-volume and low toxicity application. The recommended dilution ratio ranges: 1 part GF-120 to 4 to 10 parts water</td>
<td>Growers apply approximately 1/4-1 ounce of spray to each tree in several “spray spots” or every 10 feet in border crops or roosting hosts. Adjust the amount of spray according to severity of infestation and amount of foliage requiring spray coverage.</td>
<td>Fruit fly-preferred hosts include Cassava, Castor Bean*, Christmas Berry, Cocklebur, Corn*, Hibiscus, Panax, Sudex*, Ti and Wiliwili. *Most preferred roosting hosts</td>
</tr>
<tr>
<td>The GF-120 solutions are used as sprays. They should not be stored for future applications as the mixture quickly breaks down. Spray bottles should be washed thoroughly after each use to prevent clogging.</td>
<td>The thicker GF-120 mixture at 1 part GF-120 to 4 parts water may be “painted” inside lightweight buckets and hung upside-down in very humid, rainy areas. These buckets require cleaning and bait re-application should the bait become moldy.</td>
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<tr>
<td>Application Rates</td>
<td>Protein bait works best when applied to the underside of leaves every 7 days. Re-apply after rain.</td>
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<tr>
<td>Fruit tree or roosting host/border sprays:</td>
<td>-Several spot sprays per tree/10’ foliage -1/4-1 oz. GF-120 solution per tree/10’ foot border crop</td>
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<tr>
<td>Don’t forget to follow GF-120 label instructions</td>
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