



**United States
Department of
Agriculture**

Marketing and
Regulatory
Programs

Animal and
Plant Health
Inspection
Service

Plant Protection
and Quarantine

Mediterranean Fruit Fly Action Plan



Contents

List of Tables

v

List of Figures

vii

Introduction

1-1

Biology of the Mediterranean Fruit Fly

2-1

Program Organization, Staffing, and Responsibilities

3-1

Identification Procedures

4-1

Survey Procedures

5-1

Regulatory Procedures

6-1

Eradication Procedures

7-1

Rearing and Sterilization Procedures

8-1

Administrative Procedures

9-1

Appendix A

Information on Pesticides *A-1*

Appendix B

Supplemental Information *B-1*

Appendix C

Forms; Travel and Vehicle Information *C-1*

Appendix D

Web-based Resource Guide *D-1*

Glossary

Glossary-1

Index

Index-1

Contents

Tables

[TABLE 2-1: Formula for Calculating Day Degrees](#) 2-3

[TABLE 5-1: Jackson Trap Distribution and Density](#) 5-6

[TABLE 5-2: Multi-Lure Trap Distribution and Density](#) 5-6

[TABLE 6-1: Articles Regulated for Mediterranean Fruit Fly](#) 6-2

Figures

- FIGURE 4-1: *Ceratitis capitata* larva 4-4
FIGURE 4-2: Adult Medflies: *Ceratitis capitata* 4-5
FIGURE 4-3: Medfly larvae 4-5
FIGURE 4-4: Medfly pupae in soil 4-5
FIGURE 5-1: Jackson Trap Baited with Trimedlure 5-2
FIGURE 5-2: Multi-Lure Trap 5-3
FIGURE 5-3: McPhail trap 5-4
FIGURE 5-4: Jackson Trap Array Pattern 5-5
FIGURE 5-5: Multi-Lure Trap Array Pattern 5-6



Introduction

Contents

Action Statement	1-1
Users	1-1
Related Documents	1-2
Reporting Problems/Contacts	1-2
Conventions	1-2

Action Statement

This action plan provides guidelines and actions for the eradication of a Mediterranean fruit fly (Medfly) infestation. This action plan supplements information contained in the Medfly Program Manual, Plant Protection and Quarantine (PPQ) Treatment Manual, and Emergency Programs and Administrative Cadre Manuals.

Use this action plan in conjunction with other manuals when conducting emergency program activities. The information and instructions contained in this Action Plan were developed with and approved by representatives of cooperating States, the U.S. Department of Agriculture's Agricultural Research and Cooperative State Research Services, and affected industry.

All program technology and methodology employed is determined through discussion, consultation, or agreement with the cooperating State officials.

The information contained in this document is intended for use only when a Medfly infestation is known to exist. Use this action plan for guidance in implementing eradication procedures and in preventing spread to other locations. The Medfly Program Manual provides technical and general information needed to implement any phase of a Medfly eradication program. Base specific emergency program action on information available at that time.

Users

The primary users of this action plan are PPQ officers, Federal and State pest management, and plant health employees. Secondary users include industry personnel, affected homeowners, and the general public.

Related Documents

Related documents to use in conjunction with or in reference to this Action Plan include, but are not limited to: the Emergency Programs Manual, Aerial Application Manual, Treatment Manual, Fruitfly Cooperative Control Program Environmental Impact Statement, Medfly Program Specific Environmental Assessment, fruit fly guidelines, pesticide labels, etc.

Reporting Problems/Contacts

Contact the following (in order) for problems, questions, or other concerns relative to Medfly actions:

1. State or USDA program managers
2. State Regulatory Officials or APHIS State Plant Health Directors
3. Regional Program Managers
4. National Program Manager

Conventions

The success of a Medfly eradication program will depend on the voluntary cooperation and assistance received from other involved groups. The following is a list of groups which are involved in or must be kept informed of all operational phases of an emergency program.

- ◆ Other Federal State, county, and municipal agricultural officials
- ◆ Grower groups
- ◆ Universities
- ◆ Foreign Agricultural interests
- ◆ National, state, and local news media
- ◆ General public
- ◆ Public health

2

Medfly Action Plan

Biology of the Mediterranean Fruit Fly

Contents

Pest Profile	2-1
Background Information	2-1
Hosts and Damages	2-2
Life Cycle	2-2

Pest Profile

1. **Common Name:** Mediterranean Fruit Fly
2. **Scientific Name:** *Ceratitidis capitata* Weidemann
3. **Description:** The Mediterranean fruit fly is slightly smaller than a housefly with an average length of 3.5-5.0 mm. The adult has a predominantly dark body with two white bands on the yellowish abdomen. The wings have brown, yellow, black, and white markings. The female has a pointed, slender ovipositor to deposit eggs beneath the skin of host fruit. The larva is a legless maggot, creamy white in color, and may grow to a length of 0.4 inches within the host fruit.

Background Information

The Mediterranean fruit fly was first discovered in the Hawaiian islands in 1910. With an abundant supply of host fruit in which to lay its eggs, the fly multiplied rapidly, seriously reducing the yield and quality to many crops such as mango, guava, avocado, papaya, coffee, peach, and persimmon.

Native to Africa, the Medfly has spread to all countries bordering the Mediterranean Sea, Australia, Central America, South America, Europe, Hawaii, and various islands in the Pacific.

The adult female Medfly pierces the skin of the host fruit with her ovipositor and deposits from 1 to 10 eggs in the puncture. Other females may oviposit in the same puncture. Several hundred eggs have been found in a single cavity. Under normal conditions, a female may lay over 300 eggs during a lifetime. Females will not lay eggs when temperatures drop below 62 °F (17 °C).

Eggs hatch in 2 to 3 days at 79 °F (26 °C), which is optimum temperature. The larvae tunnel throughout the pulp of the host fruit to feed for 6 to 10 days. Generally, the fruit falls to the ground during or after larval development. The third instar larvae normally emerge from the fruit to pupate in the soil. However, pupation may occur anywhere; it is not necessary for the larvae to enter the soil to pupate.

Adults emerge from the pupal cases in 6 to 15 days at 79 °F. The newly emerged adults are not sexually mature and must feed on a proteinaceous substance in order to reach sexual maturity. The preoviposition period is extremely variable and depends on environmental conditions, but the minimum time spent in the preoviposition stage is 2 days. Feeding will continue during oviposition. The period of time for one generation under favorable conditions is 18 to 33 days.

Development in egg, larval, and pupal stages is greatly reduced or arrested at temperatures below 50 °F (10 °C). The pupal stage allows the species to survive unfavorable conditions, such as lack of food and water and temperature extremes.

Hosts and Damages

The Mediterranean fruit fly has been recorded infesting over 200 different types of fruits and vegetables. Fruit that has been attacked may be unfit to eat—larvae tunnel through the flesh as they feed. Decay organisms enter, leaving the interior of the fruit a rotten mass.

Life Cycle

Insect development is temperature dependent. The egg, larval, and adult development is influenced by air temperatures; the pupal development depends on soil temperatures. In both environments, a minimum temperature exists below which no measurable development takes place. For Medfly, these thresholds are 49.4°F (9.7 °C) in soil and 61.9 °F (17 °C) in air. A temperature model that is designed to use modified air temperature data for all insect stages can be used to predict the entire life cycle. A number of degrees accumulated above the developmental threshold for a life stage are called day degrees. For the model depicted in **Table 2-1** below, 622 day degrees must be accumulated before one life cycle has been completed.

TABLE 2-1: Formula for Calculating Day Degrees

Minimum Daily	Maximum Daily	Total	Average Daily	Threshold	Day Degrees
Temp °F	+ Temp °F	= Temp °F/2	= Temp °F	-Temp °F	= Temp °F
EXAMPLE: Air model using a modified 54.3 °F (12 °C) threshold limit to allow for soil versus air temperature differences)					
Minimum Daily	Maximum Daily	Total	Average Daily	Threshold	Day Degrees
54 °F	+ 74 °F	= 128 °F/2	= 64 °F	- 54 °F	= 10 °F

Program actions are guided in part by the insect life cycle data. Eradication treatments, length of trapping activities, and regulatory functions are affected primarily by the length of time it takes to complete each phase of the life cycle. Temperature data are available from the National Oceanic and Atmospheric Administration, U. S. Department of Commerce, private, State, university, or industry sources, or are generated by strategically placed soil probes and thermometers.

3

Medfly Action Plan

Program Organization, Staffing, and Responsibilities

Contents

Overview	3-1
Program Operations	3-1
Administrative Operations	3-4

Overview

At the outset of the project, the PPQ Regional Director and the chief official designated by the State in which the infestation occurs, in consultation with the program manager, will select the project manager. The project manager will organize the management structure, establish operational protocol, act as liaison with cooperators, select key personnel, develop personnel rotational schedules, develop lists of contacts and cooperators, mobilize emergency equipment and inventory supplies, and identify preliminary technical support needs. In addition, the project manager will be responsible for overall project and administrative functions. Each section head reports directly to the project manager.

First enlist PPQ personnel from those available in the affected region. If the project progresses in scope beyond regional personnel availability, draw additional personnel from the Rapid Response Team (RRT) cadre. Initial staffing will comprise two basic units — administrative and program operations. These units will coordinate their efforts simultaneously to address the immediate project staffing needs and responsibilities.

Program Operations

Project Manager

- ◆ Establishes a base of operations
- ◆ Organizes management structure
- ◆ Establishes operational protocol
- ◆ Acts as liaison with cooperators
- ◆ Selects personnel
- ◆ Mobilizes emergency equipment and inventory supplies
- ◆ Identifies preliminary technical support needs

- ◆ Establishes a daily information report system
- ◆ Maintains chronology of program activities
- ◆ Arranges for notification to concerned individuals, agencies, or groups including:
 - ❖ State departments of agriculture
 - ❖ Affected county/city governments
 - ❖ Concerned agricultural industries
 - ❖ Federal and affected State environmental protection agencies
 - ❖ Federal/State extension and research agencies
 - ❖ Food and Agriculture Organization of the United Nations
 - ❖ Concerned foreign governments
 - ❖ General public
 - ❖ Specific interest groups

Detection and Survey Officer

- ◆ Initiates and implements detection systems
- ◆ Arranges for prompt identification services
- ◆ Arranges facilities and equipment
- ◆ Implements identification procedures and authorization
- ◆ Provides shipment protocol for specimens and handling safeguards
- ◆ Contacts cooperators and industry

Regulatory Officer

- ◆ Issues emergency action notifications on affected properties
- ◆ Proposes emergency regulations, actions, and boundaries
- ◆ Provides for continuing regulatory action, if needed
- ◆ Notifies affected carriers, agricultural industries, and other industries of regulated articles
- ◆ Notifies State highway departments, weigh stations, etc., as appropriate
- ◆ Notifies public of regulatory program
- ◆ Makes available approved regulatory treatment procedures to all concerned groups
- ◆ Implements quarantine treatments and actions
- ◆ Maintains fumigation facilities
- ◆ Contacts cooperators and industry

Control Officer

- ◆ Determines appropriate pesticide use, ensures labels are adequate, and if exemptions are required
- ◆ Arranges for pesticide storage and disposal sites
- ◆ Supervises control applications
- ◆ Initiates pesticide residue monitoring program
- ◆ Implements sterile insect releases
- ◆ Contacts cooperators and industry

Technical Support Representatives

Onsite technical support will include methods development personnel and depending on program complexities could include Agricultural Research and Cooperative State Research Services, industry, extension services, and others.

- ◆ Determines field tests and technical information
- ◆ Provides for equipment support and development
- ◆ Advises on regulatory treatment technologies
- ◆ Determines adequacy of control technology in field
- ◆ Modifies release and handling technologies for sterile flies

Additional personnel and tasks to be considered in an expanded program operation are listed below.

Air Operations Officer

- ◆ Provides for equipment needs – navigation, radio communication, and application systems
- ◆ Identifies airport facilities, permits needed, and air operations locations
- ◆ Furnishes training
- ◆ Provides guidance for aerial operations
- ◆ Contacts Federal Aviation Administration, State, county, and municipal officials and support technicians

Safety Officer

- ◆ Determines safety procedures and regulations.
- ◆ Identifies safety equipment needs
- ◆ Establishes contacts with poison control centers, hospitals, cooperators, and Federal and State occupational safety and health administrations

- ◆ Provides for safety training
- ◆ Conducts safety inspections

Information and Public Relations Officer

- ◆ Contacts APHIS personnel, cooperators, law enforcement, television, radio, newspapers, magazines, special interest groups, industry, and State and local departments of agriculture
- ◆ Coordinates domestic and foreign visitor activities

Administrative Operations

Administrative Officer

Responsible for all administrative support functions

- ◆ Arranges for facilities, space, furniture, and telephones
- ◆ Provides supplies, manuals, and forms
- ◆ Furnishes equipment—automated data processing, word processing, and other communication equipment
- ◆ Provides for badges and identification cards
- ◆ Processes Government travel requests, purchase order invoice vouchers, and travel vouchers
- ◆ Prepares contracts and cooperative agreements
- ◆ Maintains motor pool
- ◆ Maintains imprest fund
- ◆ Maintains liaison with Field Servicing Office
- ◆ Maintains time and attendance records
- ◆ Arranges for travel/hotel reservations
- ◆ Processes claims and handles complaints
- ◆ Establishes and maintains inventory

Data/Graphics Services Officer

- ◆ Prepares maps, overlays, charts, signs, and placards
- ◆ Maintains equipment
- ◆ Prepares graphics
- ◆ Manages data acquisition, manipulation, and retrieval

4

Medfly Action Plan

Identification Procedures

Contents

Overview	page 4-1
Methods for Handling Specimens	page 4-1
Handling of Adults	page 4-1
Handling of Larvae	page 4-2
Microscopic Analysis	page 4-2
DNA Analysis	page 4-3
Other Identification Methods	page 4-3
Keys and Diagrams	page 4-4
Photographs	page 4-5
Quality Control	page 4-5

Overview

Correct and proper identification of the pest is key to determining whether to attempt an action, and if so, the extent, direction, and magnitude of the action, which must be cost effective and environmentally acceptable. Continued identification services during the course of a program will help determine action changes and failures.

Field personnel assigned to a program can do some sorting. In general, prepare a description of the Medfly with pictures and drawings. This should include distinguishing features which separate the target Medfly from indigenous species.

Methods for Handling Specimens

Collect as many specimens of the fruit fly as possible for screening/identification by the local designated identifier. Field personnel should carry out initial or preliminary identification.

Handling of Adults

Handle suspect adult specimens collected from sticky traps carefully. The following procedures will insure accurate identification of specimens caught in sticky material:

- ◆ Ship the entire trap. Pin the trap in a pinning box suitable for mailing. Place it in a second shipping box and put filler between the two boxes.

- ◆ Cut out a portion of the insert or trap wall surrounding the specimen. This will leave you with the specimen imbedded in sticky material on a cardboard. Put an insect pin (number two size) through the cardboard and pin the cardboard (with specimen attached) in a pinning box suitable for mailing. To ship the pinning box for identification, place it inside a second shipping box and put filler between the two boxes.

Handling of Larvae

Kill suspect larvae by placing in water, bringing to the boiling point, and cooling. Preserve in 70-75% ethyl alcohol. Forward larvae and adult specimens, along with any other insect stages that have been collected, for confirmation to the designated area identifier.

This collection information must accompany all specimens:

- ◆ Collector's name
- ◆ Address
- ◆ Phone Number
- ◆ Date collected
- ◆ Location
- ◆ A Pest Interception Form (PPQ Form 391) Marked "Urgent"
- ◆ State's Official Specimen Forms (where available)

Telephone the identifier's office before shipping specimens to alert him or her of the shipment.

Microscopic Analysis

Egg color of the Medfly is usually glistening white to a creamy-yellow, becoming slightly darker towards the time of hatching. The eggs are usually elongate and gently tapering. At the anterior end of each egg is a small micropyle.

The larvae, which develop in soft fruits, are usually maggot-like, with abdominal segment 8 truncate and the rest of the body tapered to the anterior end. The fruit fly has exarate pupae, which are pupae within the hardened cases of the last larval instars. The puparia tend to be rounded at the anterior end, have slightly out-curved lateral, dorsal, and ventral surfaces, sometimes with distinct segmentation, and the posterior end may be rounded or flat.

Adult Medflies have patterned wings. While details of the taxonomy should be left to the taxonomist, they are generally distinguished from other flies by a right angled bend of a vein in the front part of the wing called the Sc vein just before it joins the costa (the leading edge of the wing). Another feature is the presence of frontal setae. These setae are found right above the antennae, on each side between the eyes.

There are other important features dealing chiefly with the head and wing venation, but they should be left to the identifier.

Microscopic identification is primarily through the adult form, because there is not enough known about features of the other life stages.

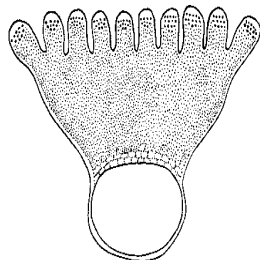
DNA Analysis

Whereas advances in DNA identification of fruit flies makes it possible, the larvae may be employed to obtain a positive identification. This requires knowledge of the DNA of the local native fruit flies as well as the Mediterranean fruit fly in order to make a distinction, but if this database is available, can result in identification within 1-3 days.

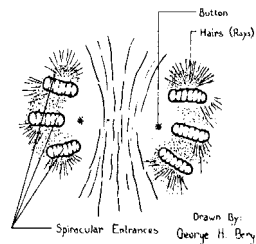
Other Identification Methods

Another means of larval identification is through Cuticular Hydrocarbon Analysis. A discriminant model is designed, based on samples of larvae of the fruit fly and that of other native fruit flies in the area under quarantine. The difference in the ratio of two components is sufficient to discriminate third instars. Accuracy in discrimination, utilization of specimens that are damaged, dried, or otherwise unusable for DNA analysis, low cost per sample, and automation of the process all make CHC analysis a particularly effective identification process.

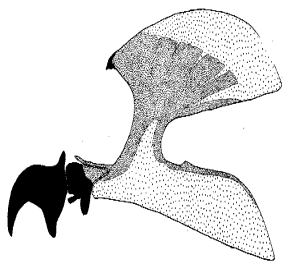
Keys and Diagrams



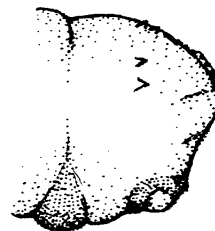
Anterior spiracle of larva



Posterior spiracles of mature larva



Cephalopharyngeal skeleton, lateral view



Caudal end of larva, lateral view

FIGURE 4-1: *Ceratitis capitata* larva

Photographs



FIGURE 4-2: Adult Medflies: *Ceratitis capitata*

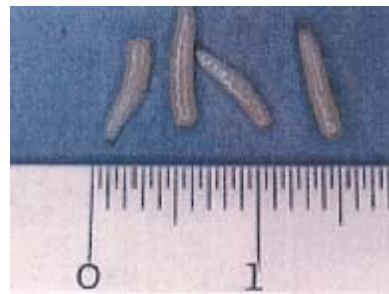


FIGURE 4-3: Medfly larvae



FIGURE 4-4: Medfly pupae in soil

Quality Control

Each state will follow quality control/quality assurance procedures as outlined in its routine Detection Program.

5

Medfly Action Plan

Survey Procedures

Contents

Overview	5-1
Orientation of Survey Personnel	5-2
Detection Survey	5-2
Jackson Trap: Primary Detection Survey Method	5-2
Description	5-2
Multi-Lure Trap: Secondary Detection Survey Method	5-3
Description	5-3
Assembly	5-3
Attractant	5-3
Baiting	5-4
Safety Precautions	5-5
McPhail Trap: Other Detection Survey Method	5-5
Description	5-5
Assembly	5-5
Attractant	5-5
Baiting	5-6
Trap Densities	5-6
Inspection Frequency	5-6
Selection of Trapping Sites	5-6
Detection by Fruit Cutting	5-6
Detection by Host Collection and Holding	5-7
Delimiting Survey	5-7
Jackson Trap Primary Delimiting Survey Method	5-8
Multi-Lure Trap Secondary Delimiting Survey	5-8
Other Survey Methods: Soil Sampling	5-9
Monitoring/Evaluation Survey	5-9
Larval Survey	5-10
Survey Records	5-10
Quality Control	5-10

Overview

The purpose of the survey is to determine the extent and means of pest spread. Conversely, it is also used to determine pest-free areas. Consider human and other natural means of dispersal and factor into an active survey if not adequately covered under **Regulatory Procedures**.

Any survey system should consider the existing survey system already in place (if present). These are usually the State or local systems set up to detect various species of fruit flies and which may in fact have detected the original find or finds. These systems may be upgraded, expanded and strengthened for program efforts.

Orientation of Survey Personnel

Experienced personnel should train new personnel on the job. Three working days will be necessary to teach the many important facets of Medfly survey. Other survey personnel rules and guidelines set by each individual State apply.

Detection Survey

Place traps in the area beyond the outer zone at the rate of five Jackson traps per square mile. Service these traps at least every two weeks. Service the traps for three generations and relocate after each servicing, depending on availability of preferred host.

Jackson Trap: Primary Detection Survey Method



FIGURE 5-1: Jackson Trap Baited with Trimedlure

Description

The delta-shaped Jackson trap (**Figure 5-1**) is made of plastic coated cardboard. Lure is placed on a cotton roll wick that is supported inside the trap by a wire wick holder, or a plug dispenser is placed in a dispenser holder that is supported by the hanger. A sticky insert on the bottom captures flies.

The trap consists of the trap body, insert, and trap hanger. In addition, either a dispenser holder and plug dispenser or a wick holder and wick are used to hold the lure. Trap hangers and dispenser holders are reusable and should be saved.

Multi-Lure Trap: Secondary Detection Survey Method



FIGURE 5-2: Multi-Lure Trap

Description

The Multi-Lure trap (**Figure 5-2**) is a plastic trap consisting of four major parts: top (clear), bottom (yellow), hanger (non-rusting wire), and baits (three pack combo). The Multi-Lure trap also has a plug dispenser with a cap, and clips molded into the clear top for suspending an insert. The trap can be used wet or dry, and allows for many different variations. Flies enter from below through an opening and either drown in the liquid solutions, if used wet, or are killed by a vapoona strip or caught on an insert, if used dry.

Assembly

No assembly is required for this trap, other than twisting the clear top onto the yellow bottom. The ML trap has three legs that can be used to anchor the trap during assembly and dis-assembly. Drill three holes into the top of any service platform to secure the legs during the servicing procedure.

Attractant

Putrescine (FFP), ammonium acetate (FFA), and trimethylamine (FFT) are used as synthetic food attractants and attract both male and female flies.

Baiting

Remove the protective cover of the bait patch and use it to press the patch against the trap surface so that the adhesive on the back of the patch thoroughly adheres to the trap. There are three different patches, identified by the **last** letters “P,” “A,” and “T.” The “FFA” and the “FFT” bait patches are identical once the packaging is removed, so it is necessary to standardize the placement of the patches in case one falls off.

Bait the trap with the putrescine (“P”) by attaching the bait package (inclusive of adhesive) on the clear wall directly under the yellow cap. Looking down on the top of the trap and moving **clock wise**, attach the “A” and then the “T” patches on “opposite” sides at the top of the inside of the clear portion (top) of the trap. Immediately dispose of the protective covers.

Wet Use A

Borate and Water—one week service schedule

Bait the traps as described above and then continue with the following procedures.

Add 300 – 400 ml of water (amount used depends on evaporation) with 3% **Sodium Tetraborate decahydrate** by volume (approximately 1 level teaspoon). Add 3 – 4 drops of the surfactant Triton to break the surface tension and improve capture of attracted flies. No poison (Vapona) strip is needed, as flies will drown in the water.

Wet Use B

Propylene Glycol “PG”—two week service schedule

Bait the traps as described above and then continue with the following procedures.

Add 300 – 400 ml of 10% PG solution. The solution should be reused. Strain the insects and leaf debris from the PG solution directly into a metric measuring cup. **Use a very fine mesh kitchen strainer in this procedure.** Top off with fresh 10% mixture from a properly labeled storage container to bring the volume back up to 400 ml and carefully pour the PG back into the bottom of the trap before hanging. Maintain the volume of 10% propylene glycol (PG) in the bottom of the trap at 400 ml. The amount replenished will depend on evaporation.

IF it becomes necessary to dispose of the solution, collect and take it to an auto service center, unless you have cleared another disposal method with the Environmental Protection Agency in your county.

Safety Precautions

All three lure components can be irritating to eyes, skin, and the upper respiratory system. They emit toxic fumes if burned.

1. Bait traps **outdoors** in a well-ventilated area.
2. Use the packaging or tweezers whenever handling bait patches.
3. Dispose of spent bait patches daily.
4. Do not work inside ML or IPM trap storage areas.
5. Do not burn or store near flames. Evacuate the area in case of fire in storage area.
6. Do not open bait packages inside offices or vehicles, and do not store used traps in offices as they retain the bait odor! Store spare used traps in watertight containers in the bed of a pickup truck or in a chemical shed.

McPhail Trap: Other Detection Survey Method



FIGURE 5-3: McPhail trap

Description

The McPhail trap (**Figure 5-3**) is a glass trap with a water reservoir. Flies enter from below through the opening and drown in the solution. The trap is baited by filling the reservoir with water and Torula yeast and borax pellets.

Assembly

No assembly is required for this trap.

Attractant

Torula yeast and borax pellets act as a food attractant.

Baiting

Add water to a level just below the inside lip of the trap so that minor tilting of the trap will not cause spillage.



A splash of solution on the glass surface outside the reservoir will dry, leaving a protein residue. Dried proteins outside the reservoir will discourage flies from entering the trap and drowning in the solution).

Add 5-6 bait pellets at the host tree just prior to hanging the trap. These pellets are affected by temperature, humidity and the amount of water in the trap. If congealing occurs, reduce pellet number to five.

Trap Densities

The risk level for each county is assessed based upon an area having previous exotic fruit fly introductions and eradication programs and / or international ports of entry (airports, dockage, and marinas).

Inspection Frequency

Inspect traps once every seven days.

Selection of Trapping Sites

Selection of a trap site will depend on two main criteria:

1. A suitable host, and
2. Uniform trap distribution.

A suitable host can be defined as one of the listed host plants with fruit, preferably ripening fruit, and one that is suitable for trap placement. In selecting possible trap sites, give first consideration to the availability of hosts with fruit, in which to place the trap. Given a choice between two or more possible trap locations with hosts of equal status, give preference to the site that has multiple hosts either of the same variety or different varieties. In many cases, single trees will be the only host available and should be utilized.

Detection by Fruit Cutting

Survey preferred host fruit from the core area, first buffer, and surrounding preferred host areas, depending on host availability. Cut and examine fruit from the core area at the site.

Detection by Host Collection and Holding

If confirmation is required where single adult flies have been detected, collect and hold fruit through one Medfly life cycle at the optimum developmental temperature 79°F (29°C) and 70 percent relative humidity. Secure the fruit holding facility to prevent any inadvertent release of emerged flies. Security measures must equal those established for a quarantine insect rearing facility.

Delimiting Survey

When you collect one or more Medflies in an area, implement a delimiting survey immediately to determine the population distribution. Following the confirmation of the specimen, increase trap densities in the core square-mile area within 24 hours. Increase trap densities in the remainder of the trapping area from the core outward within 72 hours of the find. Optimally, place Jackson traps over an 81-square mile area in a 100-50-25-20-10 array (**Figure 5-4**). Service traps in the core mile daily for the first week. If you find a second fly during this first week of intensive trapping, service traps in the core area twice weekly and place increased emphasis on servicing traps in the buffer areas in an effort to better delimit the infestation. Service traps in the eight square miles around the core every two days. Check all other traps at least once within the first week. Then service all traps weekly for three life cycles of the fly beyond the last fly detected. Relocate traps to available preferred hosts as practical.

As a supplement, place McPhail traps baited with Protein Insect Bait No. 7 (or Nu-lure) or yeast tablets used in detection trapping (the PIB mixture consists of Nu-lure (9%), borax (15%), and water (86%) by weight) in the core area at the rate of five per square mile. The setting of the Jackson traps has the first priority. Trap the outer buffer (up to 100-mile radius from the core area) at the rate of 10 traps per square mile.

Jackson Trap Primary Delimiting Survey Method

Figure 5-4 illustrates the array pattern for placing Jackson traps in the field, where C = the core area; 1 = the 8 square miles around the core area; 2 = the next 16 square miles outward; 3 = the next 24 square miles; and 4 = the outermost 32 square miles.

4	4	4	4	4	4	4	4	4
4	3	3	3	3	3	3	3	4
4	3	2	2	2	2	2	3	4
4	3	2	1	1	1	2	3	4
4	3	2	1	C	1	2	3	4
4	3	2	1	1	1	2	3	4
4	3	2	2	2	2	2	3	4
4	3	3	3	3	3	3	3	4
4	4	4	4	4	4	4	4	4

FIGURE 5-4: Jackson Trap Array Pattern

Table 5-1 shows the trap distribution, density, and total number of traps in the array areas.

TABLE 5-1: Jackson Trap Distribution and Density

Area	Buffer	Total Square Miles	Traps/Square Mile	Total Traps
C	Core Area	1	100	100
1	1 Sq. Mile	8	50	400
2	2 Sq. Miles	16	25	400
3	3 Sq. Miles	24	20	480
4	4 Sq. Miles	32	10	320
	Total Sq. Miles	81	(varies)	1700

Multi-Lure Trap Secondary Delimiting Survey

Figure 5-5 illustrates the array pattern for placing Multi-Lure traps in the field, where C = the core area; 1 = the 8 square miles around the core area; 2 = the outermost 16 square miles.

2	2	2	2	2
2	1	1	1	2
2	1	C	1	2
2	1	1	1	2
2	2	2	2	2

FIGURE 5-5: Multi-Lure Trap Array Pattern

Table 5-2 shows the trap distribution, density, and total number of traps in the array areas.

TABLE 5-2: Multi-Lure Trap Distribution and Density

Area	Buffer	Total Square Miles	Traps/Square Mile	Total Traps
C	Core Area	1	50	50
1	1 Sq. Mile	8	20	160
2	2 Sq. Miles	16	20	320
	Total Sq. Miles	25	(varies)	530

Other Survey Methods: Soil Sampling

Use this procedure to supplement the survey. Take soil samples from under suspect hosts within the infested area (usually within 656 feet of a larval find) and screen for larvae/pupae at a secure facility.

Monitoring/Evaluation Survey

Carry out a monitoring/evaluation survey in the area where eradication treatments are applied. Determine the type of trap to use by the method of eradication.

1. Use the Jackson trap as the delimiting survey to monitor the wild Medfly population when using full coverage protein bait sprays.
2. Use the Jackson trap, or if not available, a dry-type trap at the rate of five traps per square mile, when using sterile fly release or a combination of sterile fly release and protein bait sprays.
3. Use the Multi-Lure or IPM female trap baited with Bio-Lures when sterile fly release is with TSL all male Medflies.
4. The Jackson trap is used at least at the minimum level equal to the delimiting survey rate to verify that eradication has been accomplished. Traps will be serviced at least through one Medfly generation after completion of eradication treatments.
5. The success of the eradication program is monitored at intensive trapping levels. If pesticide sprays are used, intensive trapping levels are maintained during treatment. If SIT is used, intensive trapping protocol replaces the SIT monitoring system gradually over a three week period after the last release of sterile flies. Traps are serviced every week for one life cycle of the fly after the last treatment or after the institution of intensive trapping protocol. If no flies are caught during that time, trap densities may return to pre-treatment detection levels based on risk assessment and regulatory restrictions may be lifted. A fly find in the area will trigger resumption of treatment.

Larval Survey

Fruit on a property where a fly has been trapped may be inspected for possible larval infestation. Small circular oviposition scars are occasionally visible, indicating an infested fruit. In the absence of visible clues, 100 or more of the fruit on preferred hosts, (if available) may be cut open at random and examined for larvae. First and second instar larvae are tiny and may be feeding immediately under the surface of the skin, therefore fruit cutting should be left to experienced personnel. Fruit on properties adjacent to a trap catch may also be inspected.

Survey Records

Records noting the survey areas, sites trapped, dates, locations, and hosts in which detections were made will be maintained. See survey section of the Medfly Program Manual for detailed instructions.

Quality Control

Each state will follow quality control/quality assurance procedures as outlined in its routine Detection Program.



Regulatory Procedures

Contents

Orientation of Regulatory Personnel	6-1
Regulated Articles	6-2
Regulated Establishments	6-3
Compliance Agreements	6-3
Regulatory Treatments	6-4
Regulatory Trapping	6-5
Principal Activities	6-5
Quarantine Actions	6-6
Removing Areas From Quarantine	6-7
Regulatory Records	6-7

Orientation of Regulatory Personnel

Use only trained or experienced personnel initially. The individual being replaced will train replacement personnel. A training period of 3 working days is necessary for the orderly transfer of these functions. Other regulatory personnel guidelines and rules set by the State apply.

Regulated Articles

The following fresh fruits, nuts, vegetables, and berries are regulated articles:

Common Name	Scientific Name
Almond with husk	<i>Prunus dulcis</i> , = (<i>P. amygdalus</i>)
Apple	<i>Malus sylvestris</i>
Apricot	<i>Prunus armeniaca</i>
Avocado	<i>Persea americana</i>
Black Myrobalan	<i>Terminalia chebula</i>
Cherry	<i>Prunus avium</i> , <i>P. cerasus</i>
Citrus citron	<i>Citrus medica</i>
Date	<i>Phoenix dactylifera</i>
Eggplant	<i>Solanum melongena</i> L.
Fig	<i>Ficus carica</i>
Grape	<i>Vitis vinifera</i>
Grapefruit	<i>Citrus paradisi</i>
Guava	<i>Psidium guajava</i>
Japanese persimmon	<i>Diospyros khaki</i>
Japanese plum	<i>Prunus salicina</i>
Kiwi	<i>Actinidia chinensis</i>
Kumquat	<i>Fortunella japonica</i>
Lemon (except commercially Grown Eureka, Lisbon And Villa Franca cultivars)	<i>Citrus limon</i>
Lemon, Meyer	<i>Citrus limon X reticulata</i>
Lemon, Rough	<i>Citrus jambhiri</i>
Lime, Sweet	<i>Citrus aurantiifolia</i>
Loquat	<i>Eriobotrya japonica</i>
Mandarin orange (tangerine)	<i>Citrus reticulata</i>
Mango	<i>Mangifera indica</i>
Mock orange	<i>Murraya exotica</i>
Mountain apple	<i>Syzygium malaccense</i> = <i>Eugenia malaccensis</i>)
Natal plum	<i>Carissa macrocarpa</i> and <i>Terminalia chebula</i>
Nectarine	<i>Prunus persica</i>
Olive	<i>Olea europea</i>
Opuntia cactus	<i>Optuntia</i> spp.
Orange, calamondin	<i>Citrus reticulata x Fortunella</i>
Orange, Chinese	<i>Fortunella japonica</i>
Orange, king	<i>Citrus reticulata x C. sinensis</i>
Orange, sweet	<i>Citrus sinensis</i>
Orange, Unshu	<i>Citrus reticulata</i> var. <i>Unshu</i>

Common Name	Scientific Name
Papaya	<i>Carica papaya</i>
Peach	<i>Prunus persica</i>
Pear	<i>Pyrus communis</i>
Pepper	<i>Capsicum annum and C. frutescens</i>
Pineapple guava	<i>Feijoa sellowiana</i>
Plum	<i>Prunus Americana</i>
Pomegranate	<i>Punica granatum</i>
Prune	<i>Prunus domestica</i>
Pummelo (Shaddock)	<i>Citrus grandis</i>
Quince	<i>Cydonia oblonga</i>
Rose apple	<i>Syzyguim jambos = (Eugina jamos)</i>
Sour orange	<i>Citrus aurantium</i>
Spanish cherry (Brazilian Plum)	<i>Eugenia dombeyi, E. brashiliensis</i>
Strawberry guava	<i>Psidium cattleianum</i>
Surinam cherry	<i>Eugenia uniflora</i>
Tomato (pink and red ripe)	<i>Lycopersicon esculentum</i>
Walnut with husk	<i>Juglans spp.</i>
White sapote	<i>Casimiroa edulis</i>
Yellow oleander (Bestill)	<i>Thevetia peruviana</i>

- ◆ Soil within the drip area of plants which produce the fruits, nuts, vegetables, or berries listed above.
- ◆ Any other products, articles, or means of conveyance of any character whatsoever, when it is determined by an inspector that they present a hazard of spreading Medfly and the person in possession thereof has been so notified.

Regulated Establishments

Try to detect the Medfly within the regulated area at establishments where regulated articles are sold, handled, processed, or moved. Establishments that might be involved include airports, landfill sites, fruit stands, farmer's markets, produce markets, flea markets, nurseries, and any other establishments that handle regulated articles. Survey personnel may place and service traps at regulated establishments that are considered a significant risk during the course of a program.

Compliance Agreements

Each state's own guidelines and protocol will govern the issuance and handling of compliance agreements.

Regulatory Treatments

The PPQ Treatment Manual and Medfly Program Manual contain the authorized chemicals, methods and rates of application, and any special application instructions. Concurrence by the national fruit fly program manager is necessary for the use of any chemical or procedure for regulatory purposes.

Aerial Bait Treatment

Applying bait spray by aircraft to regulated crops within the treatment area.

Ground Bait Treatment

Using ground spray equipment to spray regulated crops with an insecticide and protein hydrolysate bait.

Base the decision to apply bait spray (ground or aerial) on the best weather information available. If rain washes a bait application from the foliage, retreat the area. Schedule only one retreatment within the established treatment cycle. This would allow, as an example, one retreatment in any given week, if applications normally occur once a week.

Do not consider retreatment if weather reports indicate a 50 percent or greater chance of rain in the 48 hour period following washoff.

The objective is to minimize environmental contamination via bait spray washoff while maintaining a viable bait spray on the regulated crops.

Soil Treatment

An approved insecticide applied to the soil of nursery stock and/or within the drip line of host plants.

Fumigation

The application of an approved fumigant as a treatment (methyl bromide, ethylene dibromide, phostoxin) alone or in conjunction with cold treatment procedures.

Cold Treatment

The use of cold temperatures as a treatment on selected products alone or in conjunction with fumigation procedures.

Regulatory Trapping

Carry out regulatory trapping around all establishments where regulated articles are sold, handled, processed, or moved. Establishments that might be involved are: airports, landfill sites, fruit stands, farmers' markets, produce markets, flea markets, and any other establishments that handle regulated articles. Use a minimum of two Jackson traps, or if not available, two dry-type traps per establishment.

Principal Activities

The following identifies principal activities necessary for conducting a regulatory program to prevent the spread of Medfly. The extent of regulatory activity required is dependent on the degree of infestation. For example, safeguarding fruit stands throughout the entire regulated area which are engaged in only local retail activity may not be necessary when the regulations imposed are based on a limited and light infestation. On the other hand, mandatory checks of passenger baggage at airports and the judicious use of road patrols and roadblocks may be necessary where general or heavy infestations occur.

- ◆ Advising regulated industry of required treatment procedures.
- ◆ Supervising, monitoring, and certifying commodity treatments of commercial lots of fruits and vegetables.
- ◆ Contacting:
 - ❖ Security and airline personnel.
 - ❖ Fruit stands.
 - ❖ Local growers and packers.
 - ❖ Farmers, produce, and flea markets.
 - ❖ Commercial haulers of regulated articles.
 - ❖ Public transportation.
- ◆ Visiting canneries and other processing establishments.
- ◆ Monitoring the movement of waste material to and from landfills to ensure adequate disposal of regulated article refuse.
- ◆ Monitoring the movement of regulated articles through major airports and other transportation centers.
- ◆ Observing major highway and quarantine boundaries for movement of materials.

Quarantine Actions

When you detect medflies, implement the following steps in sequence:

Step 1

With the detection site considered the epicenter, issue Emergency Action Notifications (PPQ Form 523) to all growers and establishments that grow, handle, or process regulated articles within a minimum of 4.5 miles (7.2 km) requiring treatment or other approved handling procedures. Field personnel issue Emergency Action Notifications and/or comparable State notifications to the property owners or managers of all establishments handling, moving, or processing articles capable of spreading Medfly. A notification may be issued pending positive identification and/or further instruction from the Deputy Administrator.

Step 2

If necessary, the Deputy Administrator will issue a letter directing PPQ field offices to initiate specific emergency action under the Federal Plant Pest Act (7 U.S.C. 150dd) until emergency regulations can be published in the *Federal Register*.

The Federal Plant Pest Act of 1957 provides for authority for emergency quarantine action. This provision is for interstate regulatory action only; State authority provides for intrastate regulatory action. However, if the Secretary of Agriculture determines that an extraordinary emergency exists and that the measures taken by the State are inadequate, USDA can take intrastate regulatory action provided that the Governor of the State has been consulted and a notice has been published in the *Federal Register*.

The Organic Act of 1944, as amended, provides the Federal Government, either independently or in cooperation with States or political subdivisions thereof, farmers' associations and similar organizations, and individuals, the authority to carry out operations or measures to detect, eradicate, suppress, control, prevent, or retard the spread of plant pests. This Act does not provide for trespassing on private property, but relies upon State authority and willingness to use State right-of-entry authority.

Determine all employed program technology and methodology through discussion, consultation, or agreement with the cooperating State officials.

Step 3

The Deputy Administrator, through the Regional Directors, will notify State cooperators of the Medfly detection, actions taken, and actions contemplated.

USDA and cooperators will develop and provide to the RADS staff in APHIS a description of the regulated area with support documents.

Step 4

APHIS Regulatory Coordination Staff will publish in the *Federal Register* emergency regulations under the Federal Plant Pest Act.

Step 5

After a reasonable time, taking into consideration such factors as the biology of the pest, climatic conditions, and infestation spread, a proposal to promulgate quarantine under the Plant Quarantine Act will be published. The proposal will announce a date for submitting written comments, which shall be approximately 60 days after publication.

Step 6

After receipt of written comments, a final determination specifying the action decided upon will be published in the *Federal Register*. A quarantine under the Plant Quarantine Act will be enacted if eradication has not been achieved.

Removing Areas From Quarantine

Areas placed under regulations may be removed from quarantine requirements after the pest has been declared eradicated. Program management will identify areas to be removed when the equivalent of three life cycles of the Medfly have been completed since the last specimen recovery in each of those areas. One life cycle must have elapsed since the cessation of control activities. A notice of Quarantine Revocation will need to be published when areas are removed from quarantine requirements.

Regulatory Records

Maintain records as necessary, to carry out an effective, efficient, and responsible regulatory program. See the regulatory section of the Medfly Program Manual for detailed instruction.



Eradication Procedures

Contents

Overview	7-1
Triggers And General Approach	7-1
Orientation Of Eradication Personnel	7-2
Aerial Bait Treatment	7-2
Ground Bait Treatment	7-3
Other Eradication Treatments	7-3
Eradication Method Selection	7-5
Handling Of Exposed Fruit	7-7
Monitoring	7-7
Survey Records	7-7
Quality Control	7-8

Overview

Eradication of a Medfly infestation in the continental United States is essential. The following provides approved procedures available for use in most situations. These procedures include mechanical, chemical, and biological control (e.g., sterile flies). Local conditions will determine the most acceptable procedure or combination of procedures to achieve eradication.

Triggers And General Approach

Treatment occurs when a Medfly infestation is determined to exist. The following will trigger a deliberative process during which the USDA will evaluate the situation to determine whether an infestation exists or whether further delimitation activities are required:

1. Two flies within a three-mile radius and within a time period equal to one life cycle of the fly.
2. One mated female; or
3. Larvae or pupae.

Use bait applications independently or with sterile insect technique (SIT) to eradicate the pest. When using SIT, bait sprays stop reproduction of the wild flies and reduce wild fly populations to ensure the effectiveness and success of sterile Medfly releases. Consult current labels(s) for conditions or restrictions to pesticide treatments. Treatments using bait sprays independently will continue, generally for at least one life cycle of the fly past the date of the last detection. A combination of sterile fly and chemical treatments is generally used. The number and type of chemical applications and/or sterile fly release will vary depending upon the magnitude of the infestation, the length of the life cycles, and other factors as determined by risk assessment.

Use a temperature dependent model of the fly's life cycle to determine the duration and completion of treatments. Record daily high and low temperatures from the soil and air in the treatment area using a thermograph (Datapod) housed in a standard weather shelter. Locate temperature monitoring equipment at the initial fly find site and at each additional wild fly site that represents a significantly different environment or core area.

Orientation Of Eradication Personnel

Use only trained and experienced personnel initially. The individual being replaced will train replacement personnel. A training period of three working days is necessary for the orderly transfer of these functions. Other eradication personnel rules and guidelines set by the State apply.

Aerial Bait Treatment

Start full coverage aerial application of protein bait spray immediately. Apply aerial protein bait sprays at the prescribed intervals over a period equal to two life cycles. The number of sprays will vary depending on the day degree accumulations in the infested area and other factors. The area of full coverage bait spray will extend a minimum of 1.5 miles (2.4 km) beyond any infested site. After an estimated two generations of negative trapping, discontinue spray operations. Weather conditions may dictate changes in spray schedule.

Ground Bait Treatment

Start ground application of protein bait spray immediately. Spray all hosts (fruit or non-fruit bearing plants or trees which provide for reproduction of the Medfly in any stage of development) on the infested property, adjacent property, and within 200 meters (656 ft) of the known infestation at the prescribed intervals. Where inclement weather precludes the use of aerial treatments, use ground treatments to maintain a viable bait spray application at the detection location and within 200 meters (656 ft) surrounding it. Discontinue ground spraying after an estimated two generations of negative trapping or after the initiation of aerial treatment. Base the decision to apply bait spray on the best weather information available. If rain washes a bait application from the foliage, plan to retreat the area.

Do not consider retreatment if weather reports indicate a 50 percent or greater chance of rain within 24 hours following washoff.

The objective is to minimize environmental contamination via bait spray washoff while maintaining a viable bait spray in the eradication zone.

Other Eradication Treatments

Fruit Stripping and Cutting

Strip fruit from all host trees in the known-infested property and adjacent properties. Place fruit in heavyweight plastic bags, fumigate if possible, and remove to a landfill site for burial under at least one foot of fill.

Soil Drenches

You may treat the soil under host trees with fruit known or suspected to be infested with Medfly larvae. Immediately apply soil drenches out to the drip line under the trees. Apply the drench using hydraulic spray equipment operating at low pressure to wet the ground. Then water the material in to a depth of approximately one-half inch.

Follow all label precautions, or if applied under authority of a FIFRA Section 18 or 24(c), follow any required protection measures.

Sterile Release

Use three methods of sterile release to ensure that no less than one million sterile adult flies are dispersed in the infested area (core area) per square mile per week. This control method relies on flooding the area of an infestation of wild flies with sterile flies produced in rearing facilities. When the sterile flies mate with the fertile population, no offspring are produced. Gradually, the wild fly population decreases, while sterile fly population increases through continued release. When fertile flies can find only sterile flies to mate, the wild population is eradicated. Use this technique only in combination with other control methods. The release rate of sterile Medflies will be a minimum of 500,000 and 250,000 standard strain adults per square mile per week in the core and buffer areas respectively, or a minimum of 250,000 and 125,000 genetic sexing strain (GSS) adults per square mile per week in the core and buffer areas, or as recommended by a science panel. The size of the sterile release area will vary depending upon the severity of the outbreak.

Static Sterile Release

You may hang buckets of pupae on properties infested with larvae and on adjacent properties. This is not a preferred method of release because the number of flies emerging varies widely with temperature. After notifying the homeowner, personnel hang Lanai buckets filled one half inch deep with pupae on trees out of reach of children and vandals. Protect the buckets from ant predation by applying sticky insect barriers.

With the detection used as the epicenter to establish the release boundaries, establish 100 static release stations per square mile. Maintain a static release station at all detection sites.

Discontinue static sterile releases when adult sterile release systems become operational, except on properties where larvae are detected. Static sterile release stations provide an early and reliable method for immediately dispersing sterile flies into a wild fly population.

Roving Sterile Release

Generally, use roving release within the infested or core area. This release system involves the releasing of sterile adult flies from a moving vehicle. This system permits rapid dispersal of large numbers of adult flies under various favorable biological and environmental situations. Flies are released from boxes carried by trucks at the rate of 250,000 flies per square mile over a nine-square mile area. You may use this method to concentrate or supplement release in the core area, or to replace aerial release if it is not possible. Section the treatment area on detail maps. An observer who monitors the route and ensures even distribution of the flies accompanies each driver. A third crew member releases the prescribed number of flies from the back of the slowly moving vehicle.

You may also use the roving sterile release method to disperse the 250,000 sterile flies per square mile within the 3-mile (4.8 km) buffer zone surrounding the core area.

Use quality control data and wild fly populations to determine how many flies to release.

Aerial Release

Release flies at a rate of 250,00 per square mile over 49 square miles around each infested site. Aircraft, equipment, personnel, and expertise are supplied by USDA under the supervision of the Director of Emergency Projects. Release normally takes place in the early morning when temperature and wind conditions are favorable. Cool flies down, place in drop boxes and move to aircraft. Each flight can carry up to four million flies. This method of releasing sterile Medflies permits the coverage of large areas in a short period of time. Aerial release methods also provide better general distribution over the area than does either the static sterile or roving sterile release method. Distribute flies equally over the entire aerial release zone each day aerial operations are conducted.

Roving/Aerial Release

Combining the roving sterile and aerial sterile release systems will provide more options needed to establish, maintain, and adjust sterile Medfly populations in both the core area and the buffer zone.

Each method is a satisfactory method of achieving desired sterile Medfly populations. Infestation size, location, and other factors will influence the release method selected. Control personnel will make this selection.

Eradication Method Selection

The following parameters or criteria will initially determine the minimum treatments to use in achieving eradication. You can apply expanded or additional treatment actions if mutually agreed upon with cooperating agencies. Control measures will continue for at least two Medfly generations, while trapping to verify that eradication has been accomplished will continue for at least three generations.

When you detect **one adult male or unmated female in an area**, the following parameters apply:

Urban/Residential Area

- ◆ Required: Intensified trapping and fruit cutting of highly preferred hosts
- ◆ Optional: Not applicable (N/A)

Commercial Area

- ◆ Required: Intensified trapping and fruit cutting of highly preferred hosts
- ◆ Optional: N/A

When you detect **a mated female or up to five of any fly stage(s) in an area involving 5 square miles or less**, the following parameters apply:

Urban/Residential Area

- ◆ Required: Ground bait spray, soil treatment, and fruit stripping
- ◆ Optional: Aerial bait spray application, sterile insect release

Commercial Area

- ◆ Required: Ground bait spray, soil treatment.
- ◆ Optional: Fruit stripping, aerial bait spray, sterile insect releases¹

When you detect **more than one (up to five) of any fly stage(s) in an area involving more than 5 square miles**, the following parameters apply:

Urban/Residential Area

- ◆ Required: Ground bait spray, soil treatment, fruit stripping, and aerial bait spray.
- ◆ Optional: Sterile insect releases¹

Commercial Area

- ◆ Required: Ground bait spray, soil treatment, aerial bait spray
- ◆ Optional: Fruit stripping

When you detect **a mated female or more than five of any fly stage(s) in an area involving more than 5 square miles**, the following parameters apply:

Urban/Residential Area

- ◆ Required: Ground bait spray, soil treatment, fruit stripping, and aerial bait spray
- ◆ Optional: Sterile insect release

¹ Pesticide applications in core area are mandatory

Commercial Area

- ◆ Required: Ground bait spray, aerial bait spray, soil treatment
- ◆ Optional: None

Handling Of Exposed Fruit

The State's own guidelines and protocol govern procedures for handling exposed fruit.

Monitoring

Implement an effective monitoring program to aid in the evaluation of program efforts and environmental impact. Assess the application and use of pesticides and other controlled substances through the use of appropriate monitoring program criteria. The evaluation must effectively address agency, cooperator, and public concerns.

The monitoring program will include at least the following elements:

- ◆ Evaluating dye cards to monitor aerial bait application
 - ❖ Droplet size information
 - ❖ Droplet distribution information
 - ❖ Bait deposition information
 - ❖ Identification of wind drift components
 - ❖ Verification of spray block boundaries
 - ❖ Identification of skips
- ◆ Sampling to evaluate effect on environmental components, e.g. biological organism sampling by local or state agencies to determine impact of insecticides

The monitoring program should be a combined effort between the State in which the emergency program is being conducted and PPQ. If specific plans need to be developed for monitoring activities, the Invasive Species and Pest Management staff will request assistance and guidelines from NPPS.

Survey Records

Maintain records noting the location, dates, number and type of treatments, materials, and formulations used for all areas treated. See the control section of the Medfly Program Manual for detailed instructions.

Eradication ProceduresQuality Control

Quality Control

The State will follow quality control/quality assurance procedures as outlined in its routine Detection Program.



Medfly Action Plan

Rearing and Sterilization Procedures

The logistics of supplying, equipping, irradiating, packaging, and monitoring sterile fly releases is a program within itself. For detailed information involving supplies, equipment, packaging, monitoring, and quality control, see the Medfly Program Manual.



Administrative Procedures

Contents

Administrative Tasks and Training	9-1
Employee Safety	9-2
Employee Conduct	9-2

Administrative Tasks and Training

An effort should be made to anticipate the number of federal and state permanent and temporary officers who will be required to not only set up the initial project, but to maintain an ongoing one. Job openings are advertised via the appropriate media and government agency listings. Applications are then collected and interviewees screened for positions.

Once the office site has been chosen, utilities will be connected and administrative personnel brought in to address project needs. Staff from the PPQ domestic temporary duty (TDY) roster will be contacted through supervisory availability for the new quarantine.

When these team members arrive, federal and state project leaders will assess the qualifications of each staff member in order to make appropriate decisions on work assignments. TDY personnel and local, state and temporary new hires will be assigned to survey and delimit areas of potential infestation, prepare compliance agreements with growers, packers, and shippers, as well as various other duties required.

Other administrative tasks include:

- ◆ Arranges for facilities, space, furniture, and telephones.
- ◆ Provides supplies, manuals, and forms.
 - ❖ Furnishes equipment—automated data processing, word processing, and other communication equipment.
 - ❖ Provides for badges and identification cards.
 - ❖ Processes government travel requests, purchase order invoice vouchers, and travel vouchers.
 - ❖ Prepares contracts and cooperative agreements.
 - ❖ Maintains motor pool.
 - ❖ Maintains imprest fund.
 - ❖ Maintains liaison with Field Servicing Office.
 - ❖ Maintains time and attendance records.
 - ❖ Arranges for travel/hotel reservations.
 - ❖ Processes claims and handles complaints.
 - ❖ Establishes and maintains inventory.

Employee Safety

Follow employee safety guidelines as outlined by the State.

Employee Conduct

Follow employee conduct guidelines as outlined by the State.



Appendix A

Information on Pesticides

Contents

General Safety Information	A-1
First Aid Suggestions	A-2
Managing/Monitoring Pesticide Spills	A-2
Safety Equipment	A-2
Cleanup Equipment	A-3

General Safety Information

Personnel and public safety must be prime considerations at all times. Stress safety practices in preprogram planning. Supervisors must enforce on-the-job safety procedures.

Pesticides authorized for use vary in toxicity. When used in accordance with label instructions, materials do not constitute a threat to people, wildlife, bees, etc. Specific safety precautions for each pesticide are listed on the label. In addition, observe any special precautions listed in this or specific manuals.

Keep pesticides in closed, properly labeled containers in a dry place. Store them where they will not contaminate food or feed and where children and animals cannot reach them.

When handling a pesticide, follow all precautionary labeling.

Should there be contact through spillage or otherwise, wash immediately with soap and water. Should clothing become contaminated, wash before wearing again. Refer to PPQ Treatment Manual, Section X, for additional information.

Dispose of empty pesticide containers in an approved sanitary landfill, by incineration, or by other satisfactory methods approved by the Federal Environmental Protection Agency whereby they will not present a hazard or problem. Complete arrangements for disposal of such containers and make sure that all parties directly involved with the program thoroughly understand the arrangements before the actual start of operations. Consult PPQ regional offices and the National Program Planning Staff for pertinent information in States where operations are conducted.

When applying a pesticide, consider the potential impact of the pesticide on all components of the total environment, including humans, crops, livestock, wildlife, aquatic life, non-target insect species, and domesticated honey bees. Avoid contamination of lakes, streams, ponds, or watersheds.

First Aid Suggestions

In case of accidental poisoning or as soon as any person shows symptoms of having been affected by any pesticide, take the following action:

1. Remove the person to a place where there will be no further contact with the pesticide.
2. Have the person lie down and keep quiet.
3. Call a physician and provide the name and formulation of the pesticide in use and first aid given.
4. Keep the local Poison Control Center telephone number posted where pesticides are stored and used. This number is also on the inside front cover of the telephone directory. Call Chemtrec on toll free Area Code (800) 424-9300 for additional assistance in the event of spills, leaks, fires, exposures, accidents, or other chemical emergencies.

Managing/Monitoring Pesticide Spills

Supervisors involved in pesticide application must have available and be familiar with the “Guidelines for Managing and Monitoring Pesticides Spills,” dated March 1981. In addition, make sure that the following pesticide spill safety and cleanup equipment is present at all job sites where pesticides are stored or used.

Safety Equipment

- ◆ First Aid Kit – Bus and truck kit, GSA 66545-00-664-5312 (or equivalent)
- ◆ Fire Extinguisher – 5 lb. Size for class A, B, C fires
- ◆ Portable Eye Wash Kit

Cleanup Equipment

- ◆ Absorbent material to absorb liquid spills (sand, sawdust, vermiculite, “kitty litter,” etc.)
- ◆ Broom
- ◆ Disposable coveralls (4 pairs)
- ◆ Dust pan
- ◆ Liquid detergent (1 pint bottle) and paper towels
- ◆ Plastic bags, large heavy duty, with ties (23)
- ◆ Plastic cover or tarpaulin to cover dry spills (10’ x 12’)
- ◆ Portable light source
- ◆ Respirators and pesticide cartridges (2 sets)
- ◆ Rubber boots (2 pairs)
- ◆ Rubber gloves (4 pairs)
- ◆ Scrub brushes
- ◆ Shovel, square-point, “D” handle
- ◆ Water (5 gallons)



Appendix B

Supplemental Information

Emergency Exemption

The National Fruit Fly Program Manager, in consultation with methods and research agencies, outlines treatments to use. Notify the National Fruit Fly Program Manager of all treatment plans. If treatments selected or proposed are not in conformance with current pesticide labels, an emergency exemption can be provided under Section 18 of FIFRA, as amended. The regulations for implementing emergency exemptions under Section 18 of the FIFRA were published in the Federal Register (Vol. 38, No. 231, December 3, 1973; 40 CFR 166.1 et seq.). These regulations outline the types of emergency exemptions which may be requested.

Under Section 18 of FIFRA, a Federal or State agency may be exempt from the label requirements provided the Administrator of the Environmental Protection Agency (EPA) determines that an emergency exists which requires such an exemption. An emergency exemption becomes a legal document and is issued instead of a registered label.

Section 18 regulations specify that an emergency exists when: (1) A pest outbreak has or is about to occur, and no pesticide is registered and readily available or no other appropriate method of control is available to eradicate or suppress the pest; (2) significant economic or health problems will occur without the use of the pesticide; and (3) the time available from discovery or prediction of the pest outbreak is insufficient for a pesticide to be registered for the particular use.

Three types of emergency exemptions are provided for under Section 18 regulations: specific, crisis, and quarantine. Pest conditions, program needs, and available pesticides will determine which exemption will be necessary.

Restrictions contained in the exemption provide for protection of the general public and environment. All conditions imposed by the exemption must be met. An emergency exemption may be withdrawn if EPA determines that an agency is not complying with the requirements of the exemption or that withdrawal is necessary to protect the environment.

Although an emergency exemption is issued under Section 18 of FIFRA, States are currently the primary enforcement arm for pesticide use. Therefore, any exemption still requires approval by the State in which the pesticide is used.



Appendix C

Forms; Travel and Vehicle Information

See State program guidelines for the following:

- ◆ Survey forms
- ◆ Regulatory forms
- ◆ Personnel forms
- ◆ Travel information
- ◆ Vehicle information



Appendix D

Web-based Resource Guide

USDA/APHIS/PPQ	http://www.aphis.usda.gov/ppq
Title 7 Code of Federal Regulations – Subtitle B, Chapter 3 – APHIS/USDA Regulations	http://www.access.gpo.gov/nara/cfr/waisidx_98/7cfrv5_98.html
PPQ/ISPM Fruit Fly Program	http://www.aphis.usda.gov/ppq/ispm/ff/
Exotic Fruit Fly Regulatory Response Manual	http://www.cdfa.ca.gov/fruitfly/manual
General Medfly Information and List of Hosts	http://creatures.ifas.ufl.edu/fruit/Mediterranean_fruit_fly.htm

Glossary

Aerial Bait Treatment	Applying bait spray by aircraft over a treatment area.
Aerial Sterile Release	Releasing sterile Medflies over a designated area by aircraft.
Aerial Release Area	The core area and all peripheral areas 3 miles (4.8km) beyond the nearest known infestation or to a suitable natural barrier within the 3-mile (4.8 km) peripheral area.
Array	The trapping pattern in a 1 square mile (2.6 sq. km) area.
Array Sequence	The trapping pattern (array) beginning with the core area and continuing outward through each buffer area ending with the outer buffer area.
Bait	An attractant and food source (protein hydrolysate) mixed with an insecticide for treating Medfly infestations.
Buffer Area	The area extending beyond the boundary of the core 1 mile, 2 mile, 3 mile and 4 mile buffer.
<i>Ceratitidis capitata</i> (Weidemann)	The scientific name of the Mediterranean fruit fly.
Cold Treatment	The use of cold temperatures as a treatment on selected products alone or in conjunction with fumigation procedures.
Commercial Production Area	An area where host material for commerce is grown.
Confirmed Detection	A positive laboratory identification of a submitted life form (specimen) as Medfly.
Core Area	This area involves a minimum of .5 mile (0.8 km) beyond any confirmed Medfly detection.
Day Degrees	An accumulation of heat units above a specified developmental temperature threshold during life stage.

Delimiting Survey	A survey conducted to determine the extent of the infestation in an area where Medfly has been detected.
Detection	The collection of any life stage of a Medfly.
Detection Survey	A survey conducted in a susceptible area not known to be infested with Medfly.
Epicenter/Focal Point	The initial site of an infestation.
Fruit Cutting Survey	A survey conducted by cutting fruit and examining for larvae.
Fruit Stripping	The removal and proper disposal of all Medfly host fruit from a designated area.
Fumigation	The application of an approved fumigant as a treatment (methyl bromide, ethylene dibromide, Phostoxin) alone or in conjunction with cold treatment procedures.
Ground Bait Spray	Using ground bait spray equipment to spray host vegetation in a Medfly infested area with an insecticide and a protein hydrolysate bait.
Generation (Life Cycle)	The period of time for the pest to complete all stages of development predicated on day degrees or other biological information.
Host	A plant species that provides for reproduction of the Medfly.
Infestation	The collection of larva, pupa, a mated female, or two or more Medflies from within an area of 1 square mile (2.6 sq km). During an eradication effort, the detection of a single adult determined to be associated with the current infestation will be sufficient to trigger expanded program activity.
Infested Area	The area so declared by program officials where criteria for “infestation” have been met.
Lure (Trimedlure)	The synthetic food and/or sex lure used primarily to attract male Medflies.
Medfly	The Mediterranean fruit fly, <i>Ceratitidis capitata</i> (Weidemann) of the family, Tephritidae; order, Diptera; class, Insecta.

Monitoring/ Evaluation Survey	A survey, using traps, conducted in an area where (1) marked sterile Medflies are released to determine the overflooding ration between wild and sterile flies and/or (2) a pesticide treatment has been applied and the effectiveness of the treatment is being evaluated.
PPQ-APHIS-USDA	Plant Protection and Quarantine, Animal and Plant Health Inspection Service, United States Department of Agriculture.
Quadrat	One-quarter square mile (0.6 sq km). Four quadrats per square mile.
Regulated Area	An area that extends at least 4.5 linear miles (7.2 km) in any direction from an infested property.
Regulatory Trapping	Trapping conducted around establishments where regulated articles are sold, handled, processed, or moved.
Roving Sterile Release	Releasing sterile adult flies from a moving vehicle.
Soil Treatment	The application of an approved insecticide to the soil of nursery stock and within the drip line of host plants.
Static Sterile Release	Placing pupae in protective stations (Lanai buckets) for emergence of sterile Medflies.
Sterile Release	Releasing sterile Medflies in an area as a method of eradication or as one of several methods in an integrated eradication program.
Ultra Low- Volume Bait Spray (ULV)	A mixture of an insecticide with protein hydrolysate. This mixture is applied as droplets by aircraft.
Urban/ Residential Area	Noncommercial crop production area generally containing multiple or single family dwellings.

Index

A

- absorbent material, [A-2](#)
- accidental poisoning, [A-2](#)
- accidents, [A-2](#)
- Actinidia chinensis*, [6-2](#)
- Action Statement [1-1](#)
- actions, [3-2](#)
- adjacent properties, [7-3](#), [7-4](#)
- adjacent property, [7-3](#)
- administrative functions, [3-1](#)
- Administrative Officer, [3-4](#)
- administrative personnel, [9-1](#)
- administrative support functions, [3-4](#)
- administrative tasks, [9-1](#)
- adult specimens, handling of, [4-1](#)
- Aerial Application Manual, [1-2](#)
- aerial application, [7-2](#)
- aerial bait application, [7-7](#)
- aerial bait spray application, [7-6](#)
- aerial bait spray, [7-6](#), [7-7](#)
- aerial bait treatment, [6-4](#), [7-2](#), [0-1](#)
- aerial operations, [3-3](#)
- aerial release area, [0-1](#)
- aerial release zone, [7-5](#)
- aerial release, [7-5](#)
- aerial sterile release, [0-1](#)
- aerial treatment, [7-3](#)
- affected properties, [3-2](#)
- affected region, [3-1](#)
- Africa, [2-1](#)
- agencies, [3-2](#)
- agency listings, [9-1](#)
- agricultural industries, [3-2](#)
- Agricultural Research Service, [1-1](#), [3-3](#)
- air operations locations, [3-3](#)
- Air Operations Officer, [3-3](#)
- air sampling, [7-7](#)
- aircraft, [7-5](#)
- airport facilities, [3-3](#)
- airports, [6-3](#), [6-5](#)
- almond, [6-2](#)
- Animal and Plant Health Inspection Service, [0-3](#)
- ant predation, [7-4](#)
- antennae, [4-3](#)
- APHIS personnel, [3-4](#)
- APHIS Regulatory Coordination Staff, [6-7](#)
- apple, [6-2](#)
- application systems, [3-3](#)
- approved fumigant, [6-4](#)
- approved handling procedures, [6-6](#)
- approved insecticide, [6-4](#), [0-3](#)

apricot, [6-2](#)
aquatic life, [A-1](#)
area identifier, [4-2](#)
areas of potential infestation, [9-1](#)
array sequence, [0-1](#)
array, [0-1](#)
attractant, [0-1](#)
Australia, [2-1](#)
authorization, [3-2](#)
authorized chemicals, [6-4](#)
automated data processing equipment, [9-1](#)
automated data processing, [3-4](#)
avocado, [2-1](#), [6-2](#)

B

Background information [2-1](#)
badges, [3-4](#), [9-1](#)
bait application, [6-4](#)
bait applications, [7-2](#)
bait deposition, [7-7](#)
bait spray washoff, [6-4](#), [7-3](#)
bait spray, [6-4](#), [7-3](#), [0-1](#)
bait sprays, [7-2](#)
bait, [0-1](#)
baits, [5-3](#)
bees, [A-1](#)
berries, [6-2](#), [6-3](#)
bestill, [6-3](#)
biological control, [7-1](#)
biological organism sampling, [7-7](#)
biology of the pest, [6-7](#)

Bio-Lures, [5-7](#)
black myrobalan, [6-2](#)
boots, [A-3](#)
borax, [5-5](#)
boundaries, [3-2](#)
Brazilian plum, [6-3](#)
broom, [A-2](#)
buckets of pupae, [7-4](#)
buffer area, [0-1](#)
buffer areas, [5-5](#), [7-4](#)
buffer zone, [7-5](#)

C

cactus, [6-2](#)
canneries, [6-5](#)
Capsicum, [6-3](#)
cardboard, [4-2](#)
Carica papaya, [6-3](#)
Carissa macrocarpa, [6-2](#)
carriers, [3-2](#)
Casimiroa edulis, [6-3](#)
caudal end of larva, [4-4](#)
Central America, [2-1](#)
cephalopharyngeal skeleton, [4-4](#)
Ceratitis capitata
adult of, [2-1](#)
adults of, [2-2](#), [4-5](#)
biology of, [2-1](#)
common name of, [2-1](#)
description of, [2-1](#)
development of, [2-2](#)
diagrams of, [4-4](#)
eggs of, [2-1](#), [4-2](#)
family, order, and class of, [0-2](#)
hosts of, [2-2](#)
larva of, [2-1](#)
larvae of, [4-2](#), [4-4](#), [4-5](#)
life cycle of, [2-2](#)

- photographs of, 4-5
pupae of, 4-5
pupal cases of, 2-2
puparia of, 4-2
scientific name of the Medfly, 0-1
taxonomy of, 4-3
- Ceratitis capitata*, 2-1
- charts, 3-4
- chemical applications, 7-2
- chemical control, 7-1
- chemical emergencies, A-2
- chemical treatments, 7-2
- Chemtrex, A-2
- cherry, 6-2
- chief official, 3-1
- chronology of program activities, 3-2
- citrus citron, 6-2
- Citrus*, 6-2, 6-3
- claims, 3-4, 9-2
- cleanup equipment, A-2
- climatic conditions, 6-7
- Code of Federal Regulations, D-1
- coffee, 2-1
- cold treatment procedures, 6-4
- cold treatment, 6-4, 0-1, 0-2
- collection information, 4-2
- commercial area, 7-6, 7-7
- commercial haulers, 6-5
- commercial lots, 6-5
- commercial production area, 0-1
- commodity treatments, 6-5
- communication equipment, 3-4, 9-1
- complaints, 3-4, 9-2
- compliance agreements, 6-4, 9-1
- concerned groups, 3-2
- concerned individuals, 3-2
- conduct guidelines, 9-2
- confirmed detection, 0-1
- contacts and cooperators, 3-1
- contracts, 3-4, 9-1
- control applications, 3-3
- Control Officer, 3-3
- control personnel, 7-5
- control technology, 3-3
- controlled substances, 7-7
- Conventions 1-2
- cooperating agencies, 7-5
- cooperative agreements, 3-4, 9-1
- Cooperative State Research Service, 3-3
- cooperators, 3-1, 3-2, 3-3, 3-4
- core area, 5-4, 5-5, 7-2, 7-4, 7-5, 0-1
- core square-mile area, 5-5
- costa, 4-3
- cotton roll wick, 5-2
- county officials, 3-3
- county/city governments, 3-2
- coveralls, A-2
- crops, A-1
- cuticular hydrocarbon analysis, 4-3
- Cydonia oblonga*, 6-3
-
- D**
- daily high and low temperatures, 7-2
- data acquisition, manipulation, and retrieval, 3-4
- Data/Graphics Services Officer, 3-4

Datapod, 7-2

date, 6-2

day degree accumulations, 7-2

day degrees, 2-2, 0-1

degree of infestation, 6-5

delimiting survey, 5-5, 5-7, 0-2

departments of agriculture, 3-4

Deputy Administrator, 6-6, 6-7

detail maps, 7-4

Detection and survey officer, 3-2

detection location, 7-3

detection program, 4-5, 5-8, 7-8

detection survey, 5-2, 0-2

detection systems, 3-2

detection trapping, 5-5

detection, 0-2

detergent, A-2

developmental temperature threshold, 0-1

Diospyros khaki, 6-2

Diptera, 0-2

direct application, 7-7

Director of Emergency Projects, 7-5

discriminant model, 4-3

dispenser holder, 5-2

dispenser holders, 5-2

dispersal, means of, 5-1

disposable coveralls, A-2

distinguishing features, 4-1

DNA analysis, 4-3

DNA identification, 4-3

domestic visitor activities, 3-4

drip area, 6-3

drip line, 6-4, 7-3, 0-3

drop boxes, 7-5

droplet
distribution, 7-7
size, 7-7

dry spills, A-2

dry-type trap, 5-7

dry-type traps, 6-5

dust pan, A-2

dye cards, 7-7

E

egg development, 2-2

eggplant, 6-2

emerged flies, 5-4

Emergency Action Notification, 6-6

emergency action notifications, 3-2

emergency action, 6-6

emergency equipment, 3-1, 3-2

emergency exemption, B-1

emergency program, 7-8

Emergency programs
who to inform 1-2

Emergency Programs Manual, 1-2

Emergency Programs staff, B-1

emergency quarantine action, 6-6

emergency regulations, 3-2, 6-6

employee conduct, 9-2

employee safety, 9-2

Environmental Assessment, 1-2

environmental components, 7-7

environmental conditions, 2-2

environmental contamination, 6-4, 7-3

environmental impact, 7-7

environmental monitoring, 7-3

environmental protection agencies, 3-2

Environmental Protection Agency, A-1, B-1

EPA, B-1

epicenter, 6-6, 7-4

epicenter/focal point, 0-2

equipment

- development, 3-3
- needs, 3-3
- support, 3-3

equipment, 3-4, 7-5, 8-1, 9-1

eradication personnel, 7-2

eradication program, 5-7, 0-3

eradication treatments, 2-3, 5-7, 7-3

eradication zone, 7-3

eradication, 5-7, 0-3

Eriobotrya japonica, 6-2

established treatment cycle, 6-4

ethyl alcohol, 4-2

ethylene dibromide, 6-4, 0-2

Eugenia, 6-3

Eugina, 6-2, 6-3

Europe, 2-1

exemptions, 3-3

Exotic Fruit Fly Regulatory Response Manual, D-1

exposures, A-2

extension and research agencies, 3-2

extension services, 3-3

extraordinary emergency, 6-6

eye wash kit, A-2

F

facilities and equipment, 3-2

facilities, 3-4, 9-1

farmer's markets, 6-3

farmers' associations, 6-6

farmers' markets, 6-5

Federal Aviation Administration, 3-3

Federal Plant Pest Act, 6-6, 6-7

Federal Register, 6-6, 6-7, B-1

feed, A-1

Feijoa sellowiana, 6-3

fertile population, 7-4

Ficus carica, 6-2

field offices, 6-6

field personnel, 4-1, 6-6

Field Servicing Office, 3-4, 9-2

field tests, 3-3

FIFRA, B-1

fig, 6-2

fire extinguisher, A-2

fires, A-2

first aid kit, A-2

first aid, A-2

first buffer, 5-4

flea markets, 6-3, 6-5

foliage sampling, 7-7

foliage, 6-4

Food and Agriculture Organization of the United Nations, 3-2

Foreign Agricultural interests, 1-2

foreign governments, 3-2

foreign visitor activities, 3-4

forms
 administrative, [3-4](#), [9-1](#)
 personnel, [C-1](#)
 regulatory, [C-1](#)
 survey, [C-1](#)

formulations, [7-8](#)

Fortunella japonica, [6-2](#)

fresh fruits, [6-2](#)

fruit cutting survey, [0-2](#)

fruit cutting, [5-4](#), [5-7](#), [7-5](#), [7-6](#)

fruit holding facility, [5-4](#)

fruit stands, [6-3](#), [6-5](#)

fruit stripping and cutting, [7-3](#)

fruit stripping, [7-6](#), [0-2](#)

fruits and vegetables, [6-5](#)

fruits, [6-3](#)

full coverage bait spray, [7-2](#)

fumigation facilities, [3-3](#)

fumigation procedures, [6-4](#)

fumigation, [6-4](#), [0-2](#)

furniture, [3-4](#), [9-1](#)

G

general Medfly information and list of hosts, [D-1](#)

general public, [1-2](#), [3-2](#)

generation time, [2-2](#)

generation, [0-2](#)

genetic sexing strain, [7-4](#)

gloves, [A-3](#)

Government travel requests, [3-4](#)

government travel requests, [9-1](#)

grape, [6-2](#)

grapefruit, [6-2](#)

graphics, [3-4](#)

ground application, [7-3](#)

ground bait spray, [7-6](#), [7-7](#), [0-2](#)

ground bait treatment, [6-4](#), [7-3](#)

ground spray equipment, [6-4](#)

Grower groups, [1-2](#)

growers, [9-1](#)

GSS, [7-4](#)

guava, [2-1](#), [6-2](#), [6-3](#)

Guidelines for Managing and Monitoring Pesticides
Spills, [A-2](#)

H

handling exposed fruit, [7-7](#)

handling safeguards, [3-2](#)

handling specimens, [4-1](#)

hanger, [5-2](#)

Hawaii, [2-1](#)

Hawaiian islands, [2-1](#)

highly preferred hosts, [7-6](#)

holder, wire wick, [5-2](#)

honey bees, [A-1](#)

hospitals, [3-4](#)

host availability, [5-4](#)

host collection and holding, [5-4](#)

host fruit, [2-2](#), [5-4](#)

host plants, [6-4](#), [0-3](#)

host trees, [7-3](#)

host vegetation, [0-2](#)

host, [0-2](#)

hotel reservations, [9-2](#)

humans, [A-1](#)

hydraulic spray equipment, 7-3

I

identification cards, 3-4, 9-1

identification methods, 4-3

identification procedures, 3-2

identification services, 3-2

identification, 4-1

impact of insecticides, 7-7

imprest fund, 3-4, 9-1

incineration, A-1

inclement weather, 7-3

indigenous species, 4-1

industry, 3-2, 3-3, 3-4

infestation size, 7-5

infestation spread, 6-7

infestation, 0-2

infested area, 5-6, 7-2, 7-4, 0-2

infested fruit, 5-7

infested property, 7-3, 0-3

infested site, 7-5

Information and Public Relations Officer, 3-4

information report system, 3-2

Information, background 2-1

initial identification, 4-1

initial project, 9-1

insect life cycle data, 2-3

insect pin, 4-2

Insecta, 0-2

insecticide levels, 7-7

insecticide residues, 7-7

insecticide, 6-4, 0-3

insert, 5-2

integrated eradication program, 0-3

intensive trapping levels, 5-7

intensive trapping protocol, 5-7

intensive trapping, 5-5

interest groups, 3-2

interstate regulatory action, 6-6

interviewees, 9-1

intrastate regulatory action, 6-6

Invasive Species and Pest Management, 7-8

inventory supplies, 3-1, 3-2

inventory, 3-4, 9-2

IPM female trap, 5-7

J

Jackson trap density, 5-5

Jackson trap, 5-2, 5-5, 5-7

Jackson traps, 5-5, 6-5

Japanese persimmon, 6-2

Japanese plum, 6-2

Juglans, 6-3

K

key personnel, 3-1

kitty litter, A-2

kiwi, 6-2

kumquat, 6-2

L

label instructions, [A-1](#)

lakes, [A-1](#)

Lanai buckets, [7-4](#), [0-3](#)

landfill site, [7-3](#)

landfill sites, [6-3](#), [6-5](#)

landfills, [6-5](#)

larvae, handling of, [4-2](#)

larval development, [2-2](#)

larval find, [5-6](#)

larval identification, [4-3](#)

larval infestation, [5-7](#)

larval survey, [5-7](#)

law enforcement, [3-4](#)

leaching, [7-7](#)

leaks, [A-2](#)

lemon, [6-2](#)

liaison, [3-1](#), [3-4](#)

life cycle, [0-2](#)

light source, [A-3](#)

lime, [6-2](#)

liquid detergent, [A-2](#)

liquid spills, [A-2](#)

livestock, [A-1](#)

loquat, [6-2](#)

lure, [5-2](#), [0-2](#)

Lycopersicon esculentum, [6-3](#)

M

magazines, [3-4](#)

Malus sylvestris, [6-2](#)

management structure, [3-1](#)

Mandarin orange, [6-2](#)

Mangifera indica, [6-2](#)

mango, [2-1](#), [6-2](#)

manuals, [3-4](#), [9-1](#)

maps, [3-4](#)

mated females, [7-1](#)

McPhail trap, [5-4](#)

McPhail traps, [5-5](#)

means of conveyance, [6-3](#)

means of dispersal, [5-1](#)

mechanical control, [7-1](#)

Medfly Program Manual, [1-1](#), [5-8](#), [6-4](#), [6-7](#), [7-8](#), [8-1](#)

media, [9-1](#)

Mediterranean Fruit Fly, [2-1](#)

Mediterranean Sea, [2-1](#)

methods and rates of application, [6-4](#)

methods development personnel, [3-3](#)

methyl bromide, [6-4](#), [0-2](#)

microscopic analysis, [4-2](#)

microscopic identification, [4-3](#)

mock orange, [6-2](#)

monitoring pesticide spills, [A-2](#)

monitoring program, [7-7](#), [7-8](#)

monitoring, [8-1](#)

monitoring/evaluation survey, [5-7](#), [0-3](#)

motor pool, [3-4](#), [9-1](#)

mountain apple, [6-2](#)

moving vehicle, [7-4](#)

Multi-Lure trap, [5-6](#), [5-7](#)

multi-Lure trap, [5-3](#)

municipal officials, 3-3

Murraya exotica, 6-2

N

Natal plum, 6-2

national fruit fly program manager staff, 6-4

National Oceanic and Atmospheric Administration, 2-3

National Program Manager, 1-2

National Program Planning Staff, A-1

navigation, 3-3

nectarine, 6-2

NEPA, 1-2

news media, 1-2

newspapers, 3-4

non-target insect species, A-1

notice of quarantine revocation, 6-7

NPPS, 7-8

Nu-lure, 5-5

nurseries, 6-3

nursery stock, 6-4, 0-3

nuts, 6-2, 6-3

O

occupational safety and health administrations, 3-4

Olea europea, 6-2

oleander, 6-3

olive, 6-2

operational protocol, 3-1

Operations, program, 3-1

optimum developmental temperature, 5-4

Optunia, 6-2

orange, 6-2

Organic Act of 1944, 6-6

outbreak, 7-4

outer buffer, 5-5

overlays, 3-4

oviposition scars, 5-7

oviposition, 2-2

ovipositor, 2-1

P

Pacific islands, 2-1

packaging, 8-1

packers, 9-1

papaya, 2-1, 6-3

paper towels, A-2

peach, 2-1, 6-3

pear, 6-3

pepper, 6-3

peripheral area, 0-1

permits, 3-3

Persea americana, 6-2

persimmon, 2-1

personnel forms, C-1

personnel rotational schedules, 3-1

personnel, 3-1, 7-5

pest conditions, B-1

Pest Interception Form (PPQ Form 391), 4-2

pest outbreak, B-1

pest spread, 5-1

pest-free areas, 5-1

- pesticide
 - disposal sites, 3-3
 - labels, 3-3
 - residue monitoring program, 3-3
 - storage, 3-3
 - use, 3-3
- pesticide application, A-2
- pesticide cartridges, A-3
- pesticide containers, A-1
- pesticide labels, B-1
- pesticide spillage, A-1
- pesticide spills, A-2
- pesticide sprays, 5-7
- pesticide treatment, 0-3
- pesticide treatments, 7-2
- pesticide, A-1, A-2
- pesticides in respirable air, 7-7
- pesticides, 7-7, A-1
- Phoenix dactylifera*, 6-2
- Phostoxin, 0-2
- phostoxin, 6-4
- PIB mixture, 5-5
- pineapple guava, 6-3
- pinning box, 4-1, 4-2
- placards, 3-4
- Plant Protection and Quarantine, 0-3
- Plant Quarantine Act, 6-7
- plastic bags, A-2
- plastic cover, A-2
- plug dispenser, 5-2, 5-3
- plum, 6-3
- Poison Control Center, A-2
- poison control centers, 3-4
- poisoning, A-2
- political subdivisions, 6-6
- pomegranate, 6-3
- ponds, A-1
- population distribution, 5-5
- portable eye wash kit, A-2
- portable light source, A-3
- PPQ field offices, 6-6
- PPQ Form 523, 6-6
- PPQ personnel, 3-1
- PPQ Regional Director, 3-1
- PPQ regional offices, A-1
- PPQ Treatment Manual, 6-4, A-1
- PPQ/ISPM Fruit Fly Program, D-1
- PPQ-APHIS-USDA, 0-3
- precautionary labeling, A-1
- preferred host areas, 5-4
- preferred hosts, 5-5, 5-7, 7-5
- preliminary identification, 4-1
- preoviposition period, 2-2
- preprogram planning, A-1
- primary delimiting survey method, 5-5
- principal activities, 6-5
- Problems
 - reporting 1-2
- processing establishments, 6-5
- produce markets, 6-3, 6-5
- profile of Medfly, 2-1
- program activities, 3-2
- program manager, 3-1
- program needs, B-1
- program operations, 3-1
- program staffing, 3-1

project leaders, 9-1

project manager, 3-1

project needs, 9-1

project staffing needs, 3-1

property owners, 6-6

protective stations, 0-3

protein bait spray, 5-7, 7-2, 7-3

protein hydrolysate bait, 6-4, 0-2

protein hydrolysate, 0-3

Protein Insect Bait No. 7, 5-5

proteinaceous substance, 2-2

prune, 6-3

Prunus, 6-2, 6-3

Psidium, 6-2, 6-3

public concerns, 7-7

public health, 1-2

public safety, A-1

public transportation, 6-5

Punica granatum, 6-3

pupal development, 2-2

pupation, 2-2

purchase order invoice vouchers, 3-4, 9-1

Pyrus communis, 6-3

Q

quadrat, 0-3

quality assurance procedures, 4-5, 5-8

quality assurance, 7-8

quality control data, 7-5

quality control procedures, 4-5, 5-8

quality control, 7-8, 8-1

quarantine actions, 6-6

quarantine boundaries, 6-5

quarantine insect rearing facility, 5-4

quarantine revocation, 6-7

quarantine treatments, 3-2

quince, 6-3

R

radio communication, 3-3

radio, 3-4

RADS staff, 6-7

rain, washing bait from foliage, 7-3

Rapid Response Team (RRT), 3-1

rearing facilities, 7-4

rearing, 8-1

Regional Directors, 6-7

Regional Program Managers, 1-2

registered label, B-1

regulated area, 6-3, 6-7, 0-3

regulated article refuse, 6-5

regulated articles, 6-2, 6-3, 6-5, 6-6

regulated crops, 6-4

regulated establishments, 6-3

regulated industry, 6-5

regulations, 3-3

regulatory action, 3-2

Regulatory Coordination Staff, 6-7

regulatory forms, C-1

regulatory functions, 2-3

Regulatory Officer, 3-2

regulatory personnel, 6-1

regulatory program, 3-2
regulatory records, 6-7
regulatory trapping, 6-5, 0-3
regulatory treatment procedures, 3-2
regulatory treatment technologies, 3-3
regulatory treatments, 6-4
Related Documents 1-2
release and handling technologies for sterile flies, 3-3
release boundaries, 7-4
removing areas from quarantine, 6-7
replacement personnel, 7-2
residues, 7-7
respirable air, 7-7
respirators, A-3
retreatment, 6-4, 7-3
right-of-entry authority, 6-6
risk assessment, 7-2
road patrols, 6-5
roadblocks, 6-5
rose apple, 6-3
roving sterile release, 7-4, 0-3
roving/aerial release, 7-5
rubber boots, A-3
rubber gloves, A-3
runoff, 7-7

S

safety equipment, 3-3, A-2
safety guidelines, 9-2
safety information, A-1
safety inspections, 3-4
Safety Officer, 3-3
safety practices, A-1
safety precautions, A-1
safety procedures, 3-3, A-1
safety training, 3-4
sand, A-2
sanitary landfill, A-1
sapote, 6-3
sawdust, A-2
Sc vein, 4-3
science panel, 7-4
scrub brushes, A-3
secondary delimiting survey, 5-6
secondary detection survey, 5-3
Secretary of Agriculture, 6-6
section head, 3-1
secure facility, 5-6
security measures, 5-4
setae, 4-3
sex lure, 0-2
shaddock, 6-3
shipment protocol, 3-2
shippers, 9-1
shipping box, 4-1, 4-2
shovel, A-3
signs, 3-4
SIT monitoring system, 5-7
SIT, 5-7, 7-2
skeleton, cephalopharyngeal, 4-4
skips, 7-7
soil drenches, 7-3
soil probes, 2-3

soil sampling, 5-6, 7-7

soil treatment, 6-4, 7-6, 7-7, 0-3

soil, 6-3, 6-4, 7-3

Solanum melongena, 6-2

sour orange, 6-3

South America, 2-1

space, 3-4, 9-1

Spanish cherry, 6-3

special application instructions, 6-4

special interest groups, 3-4

special precautions, A-1

specimen confirmation, 5-5

specimen recovery, 6-7

specimen, 4-2

specimens, 3-2, 4-1

spills, A-2

spiracle, 4-4

spray block boundaries, 7-7

spray schedule, 7-2

standard strain adults, 7-4

State cooperators, 6-7

State departments of agriculture, 3-2

State highway departments, 3-2

State notifications, 6-6

State officials, 3-3, 6-6

State Plant Health Directors, 1-2

State Regulatory Officials, 1-2

static release stations, 7-4

static sterile release, 7-4, 0-3

sterile flies, 3-3, 5-7, 7-1, 7-4

sterile fly release, 5-7, 7-2, 8-1

sterile insect release, 7-6

sterile insect releases, 3-3

sterile insect technique, 7-2

sterile Medfly populations, 7-5

sterile Medfly releases, 7-2

sterile release area, 7-4

sterile release, 7-4, 0-3

sterilization, 8-1

sticky insect barriers, 7-4

sticky insert, 5-2

sticky material, 4-2

sticky traps, 4-1

strawberry guava, 6-3

streams, A-1

supplemental information, B-1

supplies, 3-4, 8-1, 9-1

support documents, 6-7

support technicians, 3-3

Surinam cherry, 6-3

survey
 delimiting, 5-5
 detection, 5-2
 larval, 5-7

survey forms, C-1

survey personnel, 5-1, 6-3

survey records, 5-8, 7-8

survey system, 5-1

survey, delimiting, 5-7

survey, monitoring/evaluation, 5-7

susceptible area, 0-2

suspect adult specimens, 4-1

suspect hosts, 5-6

Syzygium malaccense, 6-2

Syzygium jambos, 6-3

T

tangerine, [6-2](#)

tarpaulin, [A-2](#)

TDY roster, [9-1](#)

technical information, [3-3](#)

technical support needs, [3-1](#), [3-2](#)

Technical Support Representatives, [3-3](#)

telephones, [3-4](#), [9-1](#)

television, [3-4](#)

temperature data, [2-3](#)

temperature dependent model, [7-2](#)

temperature model, [2-2](#)

temperature monitoring equipment, [7-2](#)

temperature threshold, [0-1](#)

temporary duty roster, [9-1](#)

Tephritidae, [0-2](#)

Terminalia chebula, [6-2](#)

Terminalia chebula, [6-2](#)

thermograph, [7-2](#)

thermometers, [2-3](#)

Thevetia peruviana, [6-3](#)

third instar larvae, [2-2](#)

time and attendance records, [3-4](#), [9-2](#)

tomato, [6-3](#)

toxicity of pesticides, [A-1](#)

training period, [7-2](#)

training, [3-3](#), [9-1](#)

transportation centers, [6-5](#)

trap body, [5-2](#)

trap density, [5-5](#)

trap hanger, [5-2](#)

trap hangers, [5-2](#)

trapping activities, [2-3](#)

travel information, [C-1](#)

travel reservations, [9-2](#)

travel vouchers, [3-4](#), [9-1](#)

travel/hotel reservations, [3-4](#)

treatment area, [6-4](#)

Treatment Manual, [1-1](#), [1-2](#), [6-4](#)

treatment procedures, [6-5](#)

treatment, [6-6](#)

trimedlure, [5-2](#), [0-2](#)

TSL all male Medflies, [5-7](#)

U

U. S. Department of Commerce, [2-3](#)

ultra low-volume bait spray, [0-3](#)

ULV, [0-3](#)

United States Department of Agriculture, [0-3](#)

Universities, [1-2](#)

urban/residential area, [7-5](#), [7-6](#), [0-3](#)

USDA program managers, [1-2](#)

USDA/APHIS/PPQ, [D-1](#)

users of the action plan, [1-1](#)

V

vandals, [7-4](#)

vapona strip, [5-3](#)

vegetables, [6-2](#), [6-3](#)

vehicle information, [C-1](#)

vermiculite, [A-2](#)

visible clues, [5-7](#)

Vitis vinifera, 6-2

W

walnut, 6-3

washoff, 6-4, 7-3

waste material, 6-5

water sampling, 7-7

watersheds, A-1

weather shelter, 7-2

web-based resource guide, D-1

weigh stations, 3-2

white sapote, 6-3

wick, cotton roll, 5-2

wild flies, 7-2, 7-4

wild fly population, 7-2, 7-4, 7-5

wild fly site, 7-2

wild Medfly population, 5-7

wildlife, A-1

wind drift components, 7-7

wing venation, 4-3

wire wick holder, 5-2

word processing equipment, 9-1

word processing, 3-4

work assignments, 9-1

written comments, 6-7

Y

yeast tablets, 5-5

yellow oleander, 6-3

