

United States  
Department of  
Agriculture

ACTION PLAN

PEACH FRUIT FLY  
Dacus zonatus Saunders

Animal and  
Plant Health  
Inspection  
Service

Plant Protection  
and Quarantine

Cooperating State  
Departments of  
Agriculture

March 1988

This PPQ Action Plan or New Pest Response Guideline has not been updated since its publication date. The actions or guidelines recommended may not be appropriate now, new survey tools may be available, and chemical pesticides named may no longer be registered. This documents is posted until updated versions can be drafted and as such are only guidelines that represent the state of knowledge at the time they were written. Please consult PPQ and/or your State Plant Regulatory Official prior to implementing any recommendations listed herein.

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Comments

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## AUTHORIZATION

This Action Plan provides guidelines and actions for the eradication of a peach fruit fly infestation. This Action Plan supplements information contained in the PPQ Treatment, Emergency Programs, and Administrative Procedures Manuals.

It is to be used 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 the Animal and Plant Health Inspection Service (APHIS), cooperating States, the Agricultural Research Service, Cooperative State Research Service, and affected industry.

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

NOTICE

Pesticides recommended in this Action Plan are registered or may be exempted under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended. Precautions on the pesticide label and all instructions in this Action Plan must be carefully followed.

Federal and/or State personnel may not make any warranty or representation, expressed or implied, concerning the use of these products and shall not be responsible for any loss, damage, or injury sustained as a result of the use of any product as specified in this Action Plan.

The use of trade names in this Action Plan does not imply an endorsement of those products or of the manufacturers thereof by Federal-State pest control programs. Equivalent formulations under different trade names are acceptable.

D. Hummel  
Deputy Administrator  
Plant Protection and Quarantine

12-21-87  
Date

W. M. Mullen  
Chairman  
National Plant Board

1-14-88  
Date

## I. GENERAL INFORMATION

### A. Action Statement

The information contained in this document is intended for use only when a peach fruit fly (PFF) infestation is known to exist. This Action Plan is to be used for guidance in implementing eradication procedures and in preventing spread to other locations. It provides technical and general information needed to implement any phase of a PFF eradication program. Specific emergency program action is to be based on information available at the time of infestation.

### B. Background Information

The PFF is native to Asia. This tephritid fly occurs in Southeast Asia, Egypt, India, Mauritius, Moluccas Islands, Pakistan, Reunion Island, Sri Lanka, and Thailand. An infestation in California in 1984 was eradicated. The PFF has been recorded worldwide on 42 different fruit hosts. Injury to fruit occurs through oviposition punctures and subsequent larval feeding.

Development from egg to adult, in optimum temperatures of 80 °F (27 °C) and 70 percent relative humidity, takes approximately 10 days. The adult usually becomes sexually mature 8 to 16 days after emergence. The minimum period of time for one generation is approximately 20 days.

### C. Life Cycle Application

Insect development is temperature dependent. Egg, larval, and adult reproductive development are influenced by air temperatures. Pupal development is influenced by soil temperatures. In both environments, there is a minimum temperature threshold below which no measurable development takes place. A model can be designed to use air temperature data for all insect stages and to predict the entire 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. If available, electronic temperature recording equipment, such as a HP4CI or Biophenometer TA51, should be used.

Many of the critical parameters for PFF have yet to be determined. In the absence of other reliable data, the developmental threshold (taken from Oriental fruit fly (OFF)) is assumed to be 54.3 °F (12.2 °C) in air and 49.4 °F (9.4 °C) in soil. The number of degrees accumulated above the developmental threshold for a life stage for 1 day are called day degrees (DD). For the air model depicted in the table below, 620 DD must be accumulated before one life cycle has been completed. Note: Since PFF pupae can reportedly overwinter for periods of up to 46 days, these formulas must be used with extreme caution.

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Formula:

$$\begin{array}{cccccc} \text{Minimum} & & \text{Maximum} & & \text{Average} & & \text{Day} \\ \text{Daily} & & \text{Daily} & & \text{Daily} & & \text{Degrees} \\ \hline \text{Temp } ^\circ\text{F} & + & \text{Temp } ^\circ\text{F} & = & \frac{\text{Temp } ^\circ\text{F}}{2} = & \text{Temp } ^\circ\text{F} - & \text{Temp } ^\circ\text{F} = & \text{Temp } ^\circ\text{F} \end{array}$$

Example: (Air Model 54 °F Threshold)

$$\begin{array}{cccccc} \text{Minimum} & & \text{Maximum} & & \text{Average} & & \text{Day} \\ \text{Daily} & & \text{Daily} & & \text{Daily} & & \text{Degrees} \\ \hline 54 ^\circ\text{F} & + & 74 ^\circ\text{F} & = & \frac{128 ^\circ\text{F}}{2} = & 64 ^\circ\text{F} - & 54 ^\circ\text{F} = & 10 \text{ DD} \end{array}$$

Program actions are guided in part by 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. Unforeseen delays in completion of the life cycle must be anticipated.

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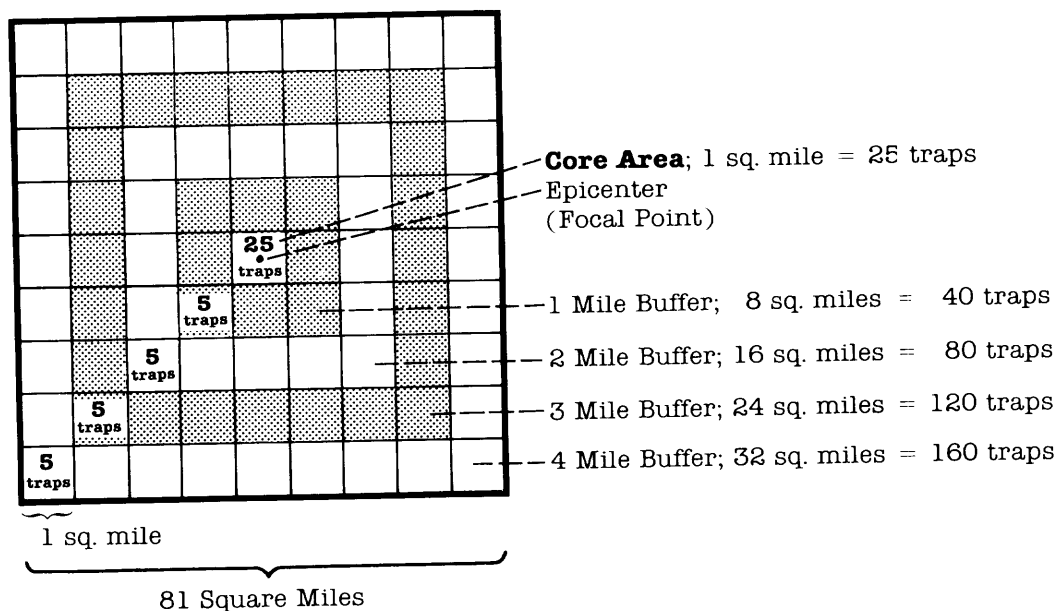
## II. SURVEY PROCEDURES

(See Addendum D for Technical Survey Information)

### A. Delimiting Survey

When one or more PFF are collected in an area, a delimiting survey will be implemented immediately to determine the population distribution. Using the site of the detection as the epicenter (focal point), Jackson<sub>2</sub> traps will be set out in a 25-5-5-5-5 per square mile (mi<sup>2</sup>) trap array sequence. The traps are to be serviced weekly, with core traps serviced daily for the first week. Traps will be maintained through three PFF generations after the last fly find.

### Traps Set Per Square Mile



McPhail traps are to be placed in the core area and the first buffer area at the same rate as the Jackson traps.

If a fly is found in a particular mi<sup>2</sup>, that area becomes an additional core area.

- B. Monitoring/  
Evaluation  
Survey      A monitoring/evaluation survey will be conducted in that area where eradication treatments are applied (See Section IV.F. for details).
- C. Fruit Cutting  
Survey      Preferred host fruit from the core, first buffer, and surrounding preferred host areas can be surveyed, depending on host availability. Fruit from the core area is to be cut and examined at the site. If fruit fly larvae are found the infested samples are taken in a sealed container for identification by an authorized entomologist.
- D. Host  
Collection  
and Holding      Fruit can be collected within approximately 200 yards (yd) of a detection and held for at least one PFF life cycle at an optimum developmental temperature of 80 °F (27 °C) and 70 percent relative humidity. Security of the facility where the fruit is held must be equal to those established for a quarantine insect rearing facility (APHIS 81-61).
- E. Detection  
Survey      The area beyond the 4-mile (mi) buffer area (up to a 100-mi radius from the core area) is trapped at the minimum rate of one Jackson trap per mi<sup>2</sup>. These traps are to be serviced for three generations and relocated after each servicing, depending on preferred host availability.
- F. Orientation  
of Survey  
Personnel      New personnel will be trained, on the job, by experienced personnel. Three working days will be necessary to teach the many important facets of the PFF survey.
- G. Survey  
Records      Records noting the areas surveyed, sites trapped, dates, locations, and hosts in which detections were made will be maintained.

### III. REGULATORY PROCEDURES

#### A. Instructions

Regulatory actions will be required until the pest is eradicated. Officers must follow instructions for regulatory treatments or other procedures when authorizing the movement of regulated articles. Understanding the instructions and procedures will serve as a basis for explaining such procedures to persons interested in moving articles affected by the quarantine and regulations. Only authorized treatment procedures may be used.

General instructions that are to be followed in regulatory treatments are found in the PPQ Treatment Manual.

#### B. Regulated Articles

1. Those fresh fruits, nuts, vegetables, and berries listed in Addendum C which exist in the regulated area, will be listed as regulated articles.

2. Cannery waste.

3. Soil within the drip area of plants which produce the fruits, nuts, bolls, vegetables, or berries listed as regulated articles.

4. Any other product, article, or means of conveyance of any character whatsoever when it is determined by an inspector that it presents a hazard of spread of PFF and the person in possession thereof has been so notified.

#### C. Quarantine

Regulatory action will be required if:

-More than five adult flies or an unmated female and a male are found in an area less than 1 mi<sup>2</sup> within one estimated PFF life cycle, or

-One mated female, or larva, or pupa are detected, or

-A single adult fly is found which is determined to be associated with a current eradication project.

When detections are made, implement the following steps:

1. Issue Emergency Action Notifications (PPQ Form 523) to all growers and establishments that grow, handle, or process regulated articles within 4.5 mi of the epicenter.

Emergency Action Notifications and/or comparable State notifications are issued by field personnel to the property owners or managers of all establishments handling, moving, or processing articles capable of spreading the PFF. Notifications will be issued pending authoritative confirmation and/or further instruction from the Deputy Administrator.

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. For other legal authorities see Section II, A and B, of the Federal Emergency Programs Manual.

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

4. A narrative description of the regulated area with support documents will be developed by the U.S. Department of Agriculture (USDA) and the cooperator and provided to the Domestic and Emergency Operations (DEO), National Programs. The regulated area will also be defined by the Universal Transverse Mercator (UTM) grid marking system for use by the Project Manager. The regulated area will normally be 81 mi<sup>2</sup>.

5. APHIS will publish an interim rule covering the emergency regulations in the Federal Register. The interim rule will announce a date for submitting written comments, which shall be approximately 60 days after publication.

6. After receipt of written comments, a final determination specifying the action decided upon will be published in the Federal Register. If after consideration of the comments a quarantine is warranted, it would be invoked under the Plant Quarantine Act.

D. Regulated Establishments Inspection

Efforts to detect the pest within the regulated area will be made at 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.

E. Use of Authorized Chemicals

The PPQ Treatment Manual and this Action Plan contain the authorized chemicals, methods and rates of application, and any special application instructions. Concurrence by the DEO, National Programs, PPQ, is necessary for the use of any other chemical or procedure for regulatory purposes.

F. Approved  
Regulatory  
Treatments

1. Soil Treatment. An approved insecticide applied to the soil within the dripline of host plants.

Diazinon--(Diazinon AG-500) 3.68 ounces (oz) (1.92 avoirdupois (avdp) oz) active ingredient (ai) of 48 percent diazinon in enough water to soak 2 inches (in) of soil over 1,000 square feet (ft<sup>2</sup>) to kill larvae, pupae, and emerging adults. Adjust water hydrogen-ion concentration (pH) to 6.5 or less prior to adding insecticide. The treatment interval will be described in the specific exemption issued by Environmental Protection Agency. Normally, treatments are applied at a 14- to 16-day interval.

Diazinon--Work Diazinon 14 G 1 to 2 in into soil at the rate of 35 lb per a<sub>2</sub> (5 lb ai/a) 1.45 oz per 12-ft diameter drip circle (113 ft<sup>2</sup>). The area should be treated with water that has been buffered (6.0-6.5) to enhance percolation of the material into the soil.

2. Fumigation. The application of an approved fumigant as a treatment (methyl bromide, Phostoxin) alone or in conjunction with cold treatment procedures.

3. Cold Treatment. The use of cold temperatures as a treatment on selected products, either alone or in conjunction with fumigation.

4. Vapor Heat Treatment. This treatment uses heated air saturated with water vapor to raise the temperature of the commodity to a required point for a specified length of time.

G. Principal  
Activities

The following identifies principal activities necessary for conducting a regulatory program to prevent the spread of PFF. 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 that are 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.

1. Advising regulated industry of required treatment procedures.

2. Supervising, monitoring, and certifying treatments of regulated articles.
3. Contact visits with:
  - a. Security and airline personnel
  - b. Fruit stands
  - c. Local growers and packers
  - d. Farmers', produce, and flea markets
  - e. Commercial haulers of regulated articles
  - f. Public transportation
  - g. Post Office contacts
4. Visiting canneries and other processing establishments.
5. Monitoring the movement of waste material to and from landfills to ensure adequate disposal of regulated articles.
6. Monitoring the movement of regulated articles through major airports and other transportation centers.
7. Observing major highway and quarantine boundaries for movement of host materials.

H. Removing Areas From Quarantine

Areas placed under regulation may be removed from quarantine requirements after the PFF has been declared eradicated. Project management will identify areas to be removed at such time that three PFF life cycles have been completed since the last specimen recovery. One life cycle must have elapsed since the cessation of control activities. APHIS will publish a Notice of Quarantine Revocation in the Federal Register when areas are removed from quarantine requirements.

I. Orientation of Regulatory Personnel

Only trained or experienced personnel will be used initially. Replacement personnel will be trained by the individual being replaced. A training period of up to 3 working days is necessary for the orderly transfer of these functions.

J. Regulatory Records

Records will be maintained as necessary to carry out an effective, efficient, and responsible regulatory program. See Addendum G of this Action Plan for detailed instructions.

#### IV. ERADICATION PROCEDURES

The DEO, in consultation with the cooperator, methods and research agencies, will outline treatments to be used and must be notified 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, or 24(c), special local need (SLN), of FIFRA, as amended. For further instructions, see Emergency Programs Manual, Section V.B.

Eradiation of a PFF infestation in the continental United States is essential. The following provides approved procedures available for use in most situations. Local conditions will determine the most acceptable procedure or combination of procedures for achieving eradication.

##### A. Eradication/ Control Method Selection

The following criteria will provide guidance for the selection of appropriate treatments to achieve eradication. Treatments suggested are the minimum recommended response to the criteria. Additional treatments can be applied if mutually agreed upon by cooperating agencies. Eradication measures will continue for at least two PFF life cycles. Trapping to verify eradication will continue for at least one PFF cycle after eradication measures have stopped.

1. If two adult flies other than mated females are detected within a 3 mile radius and within one estimated life cycle, the minimum response would be the initiation of ground applied male annihilation treatments.
2. If the infestation criteria requiring regulatory action is met within an urban area, the minimum recommended response includes the initiation of ground applied male annihilation treatments, soil treatments, and fruit stripping. Similar fly detections in a commercial area may be treated as above with the addition of bait sprays after consultation with DEO.

##### B. Recommended Pesticides

1. Malathion
2. Diazinon
3. Naled (Dibrom)

Some pesticide bait, and lure formulations can damage painted surfaces, plastic, and some uncoated metal surfaces. Care must be exercised when formulating and applying these compounds. Possible damage caused by accidental contamination can be eliminated or minimized by promptly cleaning the affected surface.

C. Approved  
Eradication  
Treatments

1. Male Annihilation Option

Spot Treatment: Apply the lure/insecticide using a Panama pump gun (available from Forestry Supplies, Mississippi) or a hydraulic oil squirt can to localized spots on utility poles, trees, fences, etc. Apply at least 600 evenly distributed stations per mi<sup>2</sup> or 60 to 80 to a city block. Apply treatment every 2 weeks. The area of coverage will be 9 mi<sup>2</sup> around each fly find.

Male Annihilation Formulation (formulated by weight)

Naled 1.75 oz (by weight)-----10 percent Dibrom 14  
\*Min-U-Gel-----23 percent Min-U-Gel 400  
Male Lure 11 fluid oz (by weight)-----67 percent methyl eugenol

The proper viscosity of the formulation must be maintained (i.e., the surface of a spot application is thick enough to hold indentations) to avoid splashback, run off, and possible ineffective treatments on nonporous surfaces.

The male annihilate is squirted on tree trunks, fences, utility poles, etc., out of the reach of children, at the rate of 0.1 to 0.2 oz (3 to 5 milliliters (mL)) per station.

\*Normally 4 oz (by weight) of Min-U-Gel is sufficient to maintain appropriate viscosity. However, additional amounts may be required to achieve desired results.

2. Aerial Proteinaceous Bait Spray Option

Treatment or retreatment should not be considered if weather reports indicate a 50 percent or greater chance of precipitation within 48 hours.

The objectives are to eradicate the pest and minimize environmental contamination. Any treatment or retreatment recommendations must consider these objectives.



Applications of full-coverage protein bait spray will be scheduled and applied 7 to 10 days apart. The area of full-coverage bait spray will extend a minimum of 1.5 mi beyond any known infestation. It may be expanded to 2.5 mi from any find if the infestation is heavy. Weather conditions may dictate changes in spray schedule. After an estimated two PFF generations of negative trapping, spray operations may be discontinued.

Ultralow volume (ULV) Malathion (Cythion)--2.4 oz liquid volume (2.2 avdp oz ai) of 91 percent technical grade malathion plus 9.6 oz of Miller's NU-LURE (protein bait) per acre.

### 3. Supplemental Eradication Methods

a. Soil Treatment: Properties with confirmed larval infestations and the environs within 200 yd will have approved soil treatments applied within a minimum of 1 yd outside the dripline of all host plants and a minimum of a 1 yd radius around any spot where host fruit may have dropped or rolled. Take particular care to soak cracks or crevices in or next to barriers to horizontal movement of larvae (i.e., sidewalks, stones, etc.). Apply prescribed treatments at intervals stated in the specific exemption or SLN, as appropriate. Normally, the interval is 14-16 days.

Diazinon--(Diazinon AG-500) 3.68 oz (1.92 avdp oz) ai of 48 percent diazinon in enough water to soak 2 in of soil over 1,000 ft<sup>2</sup> (5 lb ai/a) to kill larvae, pupae, and emerging adults. Adjust water pH to 6.5 or less prior to adding insecticide.

Diazinon--Work Diazinon 14 G 1 to 2 in into soil at the rate of 35 lb per a (5 lb ai/a) or 1.45 oz per 12-ft diameter drip circle (113 ft<sup>2</sup>). The area should be treated with water that has been buffered (6.0-6.5) to enhance percolation of the material into the soil.

b. Ground Applied Proteinaceous Bait Spray: All hosts (available shelter, oviposition, or food sites in any stage of development) on the infested property, adjacent properties, and within approximately 200 yd of the known find will be sprayed at the prescribed intervals. Ground spraying may be discontinued after an estimated two PFF generations of negative trapping or after the initiation of male annihilation or of aerial treatment.

The bait may be applied as a limited coverage application to hosts and plants providing shelter or resting areas by means of a backpack sprayer or equivalent unit.

Applications are sprayed out of reach of children or pets. If full coverage application is desired, a mistblower or similar unit can be utilized. Treatments are to be applied 7 to 10 days apart.

Subsequent applications, if in orchards or groves, may be decreased by treating every other tree.

Ground application of protein bait spray formulations historically have not significantly reduced infestations in urban areas. This failure has been attributed to the inability of crews to gain access to all sites requiring treatment, equipment constraints and timeliness of applications. Hence, this treatment should not be considered as a primary option for eradication in urban areas.

c. Fruit Stripping: All ripe preferred host fruit within 200 yds of a confirmed larval site should be promptly stripped and placed in a plastic bag and properly disposed of in an approved landfill.

- D. Orientation of Eradication/Control Personnel Only trained and experienced personnel will be used. Replacement personnel will be trained by the individual being replaced. A training period of up to 3 working days is necessary for the orderly transfer of these functions.
- E. Eradication/Control Records Records noting the location, dates, number, and type of treatments and materials and formulations used will be maintained for all areas treated. See Addendum G of this Action Plan for detailed instructions.
- F. Monitoring An effective monitoring program will be implemented to aid in the evaluation of program efforts and environmental impact. The application and use of pesticides will be assessed through the use of appropriate monitoring program criteria. The evaluation must effectively address Agency, cooperator, and public concerns.

The monitoring program may include the following elements:

1. Determine efficacy of pesticides against the target pest.
2. Evaluate dye cards to monitor aerial bait applications.
  - a. Droplet size
  - b. Droplet distribution

- c. Bait deposition
  - d. Identification of wind drift components
  - e. Identification of skips
3. Sample to evaluate effect on environmental components.
- a. Water sampling to detect any insecticide levels resulting from direct application, leaching, and run off
  - b. Soil sampling to determine insecticide levels and residues
  - c. Foliage sampling to identify residues
  - d. Biological organism sampling before, during, and after applications to determine impact of insecticides
  - e. Air sampling to determine presence of pesticides

The monitoring program is to 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 DEO will request assistance and guidelines from the Program Planning and Development Staff.

## V. CONTACTS

When a PFF eradication program has been implemented, its success will depend on voluntary cooperation, assistance, and understanding from other involved groups. The following is a list of groups which either are involved in or must be kept informed of all operational phases of an emergency program:

1. Other Federal, State, county, and municipal agricultural officials
2. Grower groups
3. Commercial interests
4. The general public
5. Universities
6. State and local law enforcement officials
7. Public health agencies
8. Foreign agricultural interests
9. National, State, and local news media
10. Post Office contacts

## VI. ADDENDA

### Addendum A--Definitions

Aerial Proteinaceous Bait Treatment:	Using an aircraft to apply an ultra-low volume mixture of insecticide and protein hydrolysate bait to a treatment area.
Array:	The trapping pattern in a 1-mi <sup>2</sup> 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 mixed with an insecticide for treating PFF infestations.
Buffer Area:	The area extending beyond the boundary of the core--1-, 2-, 3-, and 4-mi buffer.
Cold Treatment:	The use of cold temperatures as a treatment on selected products, either alone or in conjunction with fumigation.
Commercial Production Area:	An area where host material is produced for sale and not personal consumption.
Confirmed Detection:	A positive identification by a recognized expert of a submitted life form (specimen) as being PFF.
Core Area:	An area of 1 mi <sup>2</sup> surrounding a confirmed PFF detection.
<u>Dacus zonatus</u> Saunders:	The scientific name of the PFF.
Day Degrees:	An accumulation of heat units above a developmental threshold.
Delimiting Survey:	Determining whether an infestation exists and if so, the extent of the infestation in an area where the PFF has been detected.
Detection:	The collection of any life stage of PFF.
Detection Survey:	The installation and monitoring of traps in an area not known to be infested with PFF.

Developmental Threshold: The minimum (or maximum) temperature below (or above) which physiological development stops (peaks).

Epicenter/Focal Point: The initial site of an infestation.

Eradication: The confirmed removal of all PFF life forms in a specified geographical area as determined by the completion of three life cycles without pest specimens being recovered.

Fruit Cutting Survey: Cutting fruit and examining for larvae.

Fumigation: The application of an approved fumigant as a treatment (methyl bromide, Phostoxin) alone or in conjunction with cold treatment procedures.

Generation:  
(Life Cycle) The period of time required for the pest to complete all stages of development.

Ground Proteinaceous  
Bait Spray: Using ground equipment to spray host vegetation in a PFF infested area with a mixture of insecticide and protein hydrolysate bait.

Host: A plant species capable of supporting reproduction of the PFF.

Host Collection/Holding: The collection and holding of host material to determine the extent and nature of an infestation.

Infestation: The collection of five adult flies, or an unmated female and a male within an area of 1 mi<sup>2</sup> within one estimated life cycle or the detection of one mated female, a larva, a pupa, or a single adult fly determined to be associated with the current eradication project.

Infested Area: An area 1.5 mi around all detection sites unless biological factors indicate the need for more or less area.

Lure Bait:  
(Methyl eugenol) A male attractant with a thickening agent and an insecticide.

Male Annihilation  
Procedure: An eradication procedure that is designed to kill the adult PFF male. Bait stations consisting of a male lure, thickening agent, and an insecticide are applied with ground equipment.

Monitoring/Evaluation Survey: Using interdependent visual and trapping surveys, as well as environmental sampling, in an area where an insecticide treatment has been applied to evaluate the effectiveness of the application.

PPQ-APHIS-USDA: Plant Protection and Quarantine, Animal and Plant Health Inspection Service, U.S. Department of Agriculture.

Regulated Area: An area that extends at least 4 1/2 linear mi in any direction from the epicenter or an infestation. This area is normally expressed in square miles.

Regulatory Survey: Trapping conducted around establishments where regulated articles are sold, handled, processed, or transported.

Soil Treatment: The application of an approved insecticide to the soil of nursery stock and within the dripline of host plants.

Ultralow-Volume (ULV) Bait Spray: A mixture of an insecticide with a protein hydrolysate bait. This mixture is applied in very small droplets by aircraft. Normal insecticide rate is 2.4 oz per acre.

Urban/Residential Area: An area containing multiple- or single-family dwellings.

Vapor Heat Treatment: The use of heated air saturated with water vapor to raise the temperature of the commodity to a prescribed limit. This temperature is high enough to kill any PFF eggs or larvae that may be infesting the commodity.

Addendum B--Safety

1. GENERAL INFORMATION

Personnel and public safety must be prime considerations at all times. Safety practices should be stressed in preprogram planning and through out the actual program operations. Supervisors must enforce on-the-job safety procedures. For complete instructions, see V.D. in the Emergency Programs Manual.



### Addendum C--Hosts

The following list is taken from the Oriental fruit fly (OFF) host list, since it is not known what will be suitable hosts for PFF, should it become established in other parts of the world. Known PFF hosts are marked with a +.

It is not known which hosts may be preferred hosts for PFF and no assumptions should be made.

The hosts are listed by common and scientific names. In all instances, an attempt has been made to select the most widely recognized common name. Those species without an accepted or approved common name are given at the end of the list. All hosts on these lists should be regulated for PFF until more information on the status of each host is available.

#### Common Name

Acorn squash  
Akee  
Akia  
Alexander laurel  
Allspice  
Almond  
American plum  
Apple  
+Apple, common  
Apricot  
Arabian coffee  
Avocado  
Azarolus hawthorn  
Bachang mango  
Balata sapodilla  
Balsam apple hawthorn  
Balsam apple, a  
Balsam pear  
Banana  
  
Banyan fig  
Bay rum tree  
Beach naupaka  
Black mulberry

#### Scientific Name

Cucurbita pepo  
Blighia sapida  
Wikstroemia phillyraeifolia  
Calophyllum inophyllum  
Pimenta dioica  
Prunus dulcis  
Prunus americana  
Malus spp.  
Malus sylvestris  
Prunus armeniaca  
Coffea arabica  
Persea americana  
Crataegus azarolus  
Mangifera foetida  
Manilkara hexandra  
Momordica balsamina  
Momordica cochinchinensis  
Momordica charantia  
Musa paradisiaca var.  
sapientum = (Musa x  
paradisiaca)  
Ficus benghalensis  
Pimenta racemosa  
Scaevola frutescens sericea  
Morus nigra

Blue latan palm  
Bourbon orange  
Brazil cherry  
Brazilian nightshade  
Breadfruit  
Broccoli  
Bumelia  
Cactus  
Caimitillo  
Calamondin orange  
California Bay laurel  
California coffee berry  
California black walnut  
Candlenut  
Cantaloupe  
Cashew  
Chaulmoogra  
Cherimoya  
Cherry, catalina  
Cherry, hollyleaf  
  
Chilean strawberry  
Chili  
  
Chili pepper  
Chinaberry  
Chinese-date  
Chinese-date (India jujube)  
Chinese-hawthorn  
Chinese-orange  
Cirvelo  
Climbing ylang-ylang  
Cochinea cactus  
Cocoplum  
Coconut  
Country gooseberry  
Crataegus hybrid  
Cucumber  
Cucumber tree  
+Custard apple  
+Custard apple, Annona  
Cutleaf tomato  
+Date palm  
Day jessamine  
Downy rose myrtle  
Dracaena  
Dragon tree  
Dwarf banana  
Ebony persimmon

Latania loddigesii  
Ochrosia elliptica  
Eugenia dombeyi  
Solanum seafortianum  
Artocarpus altilis  
Brassica oleracea  
Bumelia buxifolia  
Cereus coerulescens  
Chrysophyllum oliviforme  
Citrofortunella japonica  
Umbellularia californica  
Rhamnus californica  
Juglans hindsii  
Aleurites moluccana  
Cucumis melo  
Anacardium occidentale  
Taraktogenos laurzii kurzi  
Annona cherimola  
Prunus lyonii  
Prunus ilicifolia  
(ornamental)  
Fragaria chiloensis  
Capsicum frutescens var.  
longum  
capsicum annuum var. annuum  
Melia azedarach  
Ziziphus jujuba  
Ziziphus mauritiana  
Crataegus pinnatifida  
Fortunella japonica  
Bunchosia armeniaca  
Artabotrys uncinatus  
Nopalea cochenillifera  
Chrysophyllum icaco  
Cocos nucifera  
Averrhoa carambola  
Crataegus lavalleyi  
Cucumis sativus  
Averrhoa bilimbi  
Annona squamosa  
Annona reticulata  
Physalis angulata  
Phoenix dactylifera  
Cestrum diurnum  
Rhodomyrtus tomentosa  
Cordyline terminalis  
Dracaena draco  
Musa acuminata  
Diospyros ferrea

Egg-fruit tree	<u>Lucuma nervosa</u>
+Eggplant	<u>Pouteria campechiana</u>
Elderberry	<u>Solanum melongena</u>
Elengi tree	<u>Sambucus glauca</u>
English walnut	<u>Mimusops elengi</u>
Evergreen dogwood	<u>Juglans regia</u>
False buckthorn bumelia	<u>Cornus capitata</u>
False ohelo	<u>Bumelia lanuginosa</u>
Fern tree	<u>Wikstroemia uva-ursi</u>
Fig	<u>Filicium decipiens</u>
+Fig, common	<u>Ficus spp.</u>
Garcinia	<u>Ficus carica</u>
Garden croton	<u>Garcinia zanthochymus</u>
Garden pea	<u>Codiaeum variegatum</u>
Garden plum (common European prune)	<u>Simarouba glauca</u>
Garden radish	<u>Prunus domestica</u>
Gardenia	<u>Raphanus sativus</u>
Geiger tree	<u>Gardenia spp.</u>
Ginger	<u>Cordia sebestena</u>
Ginseng	<u>Zingiber officiale</u>
Glossy leaf fig	<u>Panax spp.</u>
+Gourd, Ivy	<u>Ficus retusa</u>
Gourka	<u>Coccinia grandis</u>
Governor's plum	<u>Garcinia celebica</u>
Granadilla, a	<u>Flacourtia indica</u>
Grape	<u>Passiflora subpeltata</u>
Grapefruit	<u>Vitis spp.</u>
Green sapote	<u>Citrus paradisi</u>
Guama	<u>Calocarpum viride</u>
Guava	<u>Inga laurina</u>
Guaymochil	<u>Psidium guajava</u>
+Hibiscus, Chinese	<u>Pithecellobium dulce</u>
Husk tomato	<u>Hibiscus rosa-sinensis</u>
Imbu	<u>Physalis peruviana</u>
India greenstar	<u>Spondias tuberosa</u>
India mulberry	<u>Polyalthia longifolia</u>
+Indian bael	<u>Morinda citrifolia</u>
Indian rhododendron	<u>Aegle marmelos</u>
Jackfruit	<u>Melastoma malabathricum</u>
Japanese persimmon	<u>Artocarpus heterophyllus</u>
Japanese plum	<u>Diospyros kaki</u>
Java apple	<u>Prunus salicina</u>
Java plum	<u>Syzygium samarangense</u>
Jerusalem cherry	<u>Syzygium cumini</u>
+Kaenth	<u>Solanum pseudocapsicum</u>
Ketembilla	<u>Pyrus pashia</u>
King orange	<u>Dovyalis hebecarpa</u>
Kuine	<u>Citrus x nobilis</u>
	<u>Mangifera odorata</u>

Kumquat  
Langsat  
Lemon  
Liberian-coffee  
Limeberry  
Longan  
+Loquat  
Lychee  
Macadamia, a  
Madagascar olive  
+Mahua  
+Ma-kok-nam  
Malay-apple  
+Mamee-sapote  
Mammee-apple  
Mandarin (tangerine)  
Mandrone  
Mango  
Mangosteen  
+Melon, long  
Methley plum  
  
Mockorange  
Moreton Bay fig  
Mullein nightshade  
Myrobalan  
Natal plum  
Nectarine  
  
Nightshade, a  
Ohelo berry  
+Okra  
Olive  
+Olive, wild  
+Orange, sweet  
Oriental bush red pepper  
  
Otaheite apple  
Palm, a  
Palm date  
Palm syrup  
+Papaya, common  
Paradise tree  
Passion-flower, softleaf  
(banana passion fruit)  
Passion-fruit (yellow lilikoi)  
  
+Peach  
+Pear

Fortunella japonica  
Lansium domesticum  
Citrus limon  
Coffea liberica  
Triphasia trifolia  
Euphoria longan  
Eriobotrya japonica  
Litchi chinensis  
Macadamia integrifolia  
Noronhia emarginata  
Madhuca longifolia  
Elaeocarpus madopetalus  
Syzygium malaccense  
Pouteria sapota  
Mammea americana  
Citrus reticulata  
Arbutus andrachne  
Mangifera indica  
Garcinia mangostana  
Cucumis utilissimus  
Prunus salicina x Prunus  
cerasifera  
Murraya paniculata  
Ficus macrophylla  
Solanum verbascifolium  
Terminalia bellirica  
Carissa macrocarpa  
Prunus persica var.  
nectarina  
Solanum aculeatissimum  
Vaccinium reticulatum  
Abelmoschus esculentus  
Olea europaea  
Putranjiva roxburghii  
Citrus sinensis  
Capsicum frutescens var.  
abbreviatum  
Spondias cytherea  
Veitchia spp.  
Phoenix spp.  
Jubaea spectabilis  
Carica papaya  
Simarouba glauca  
Passiflora mollissima  
  
Passiflora edulis  
flavicarpa  
Prunus persica  
Pyrus communis

+Pear, sand  
 Pepino  
 Pepper, sweet  
  
 Persimmon  
 Persimmon, a  
 +Phalsa  
 Pineapple  
 Pineapple guava  
 Plum  
 +Pomegranate  
 Port Jackson fig  
 Portuguese laurel cherry  
 Pricklypear  
 Pummelo  
 Queenpalm  
 Queensland-nut  
 +Quince  
 Rambai  
 Rambutan  
 Red mombin  
 Red strawberry guava  
  
 Rose-apple  
 Rukam  
 Sandalwood  
 Santol  
 +Sapodilla  
 Sapodilla, a  
 Seagrape  
 Sesban  
 Sour lime  
 Sour orange  
 Soursop  
 Spanish-dagger  
 Star-apple  
 Strawberry  
 Strawberry guava  
 Strawberry tree  
 String bean  
 Surinam-cherry  
 Sweet cherry  
 Sweet granadilla  
 Tagua passion-flower  
  
 Tahitian chestnut  
 Tallow-wood  
 +Tomato

Pyrus pyrifolia  
Solanum muricatum  
Capsicum frutescens var.  
grossum  
Diospyros spp.  
Diospyros packmanni  
Grewia asiatica  
Ananas comosus  
Felijoia sellowiana  
Prunus cerasifera  
Punica granatum  
Ficus rubiginosa  
Prunus lusitanica  
Opuntia ficus-indica  
Citrus maxima  
Arecastrum romanzoffianum  
Macadamia ternifolia  
Cydonia oblonga  
Baccaurea motleyana  
Nephelium lappaceum  
Spondias purpurea  
Psidium cattleianum  
littorale  
Eugenia jambos  
Flacourtia jangomas  
Santalum paniculatum  
Sandericum koetjape  
Manilkara zapota  
Manilkara emarginata  
Coccoloba uvifera  
Sesbania grandiflora  
Citrus aurantiifolia  
Citrus aurantium  
Annona muricata  
Yucca aloifolia  
Chrysophyllum cainito  
Fragaria spp.  
Psidium cattleianum  
Arbutus unedo  
Phaseolus vulgaris  
Eugenia uniflora  
Prunus avium  
Passiflora ligularis  
Passiflora foetida and  
 var. gossypiella  
Inocarpus fagiferus  
Ximenia americana  
Lycopersicum esculentum

+Tropical almond

Unshu orange  
Vanda orchid  
Velvet apple  
Wampi  
Water apple  
Watermelon  
West Indian cherry  
+White flower  
White sandalwood  
White-sapote  
Wild lemon rheedia  
Wild rose  
Yellow granadilla  
Yellow mobin  
Yellow-oleander  
Yellow strawberry guava  
  
Ylang-ylang  
Yucca

Terminalia catappa  
Terminalia chebula  
Citrus nobilis unshu  
Vanda spp.  
Diospyros discolor  
Clausena lansium  
Eugenia aquea  
Citrullus lanatus  
Malpighia punicifolia  
Lagenaria siceraria  
Santalum album  
Casimiroa edulis  
Rheedia edulis  
Rosa californica  
Passiflora lauriflora  
Spondias mombin  
Thevetia peruviana  
Psidium cattleianum  
lucidum  
Cananga odorata  
Yucca spp.

No Common Name Available

Actinophloeus macarthurii  
+Amygdalus persia  
Artocarpus polyphema  
Baccauras angulata  
+Bassia latifolia  
Brassaia actinophylla  
+Careya arborea  
Chickrassia velutina  
Citrus spp.  
Citrus tankan  
Cucurbita spp.  
Elaeocarpus grandis  
Eucumis spp.  
Eugenia spp.

Eugenia palumbis  
Euphorbia spp.  
Luffa spp.  
Muntingia calabura  
Orchrosia mariannensis  
Pandanus fragrans  
Pandanus odoratissimus  
Passiflora spp.  
+Prunus bokhariensis  
Rubus spp.  
Solanum sarmentosum  
Solanum toryum  
Terminalia melanocarpa  
Ziziphus spp.

Addendum D--Technical Survey Information

1. The Jackson Trap

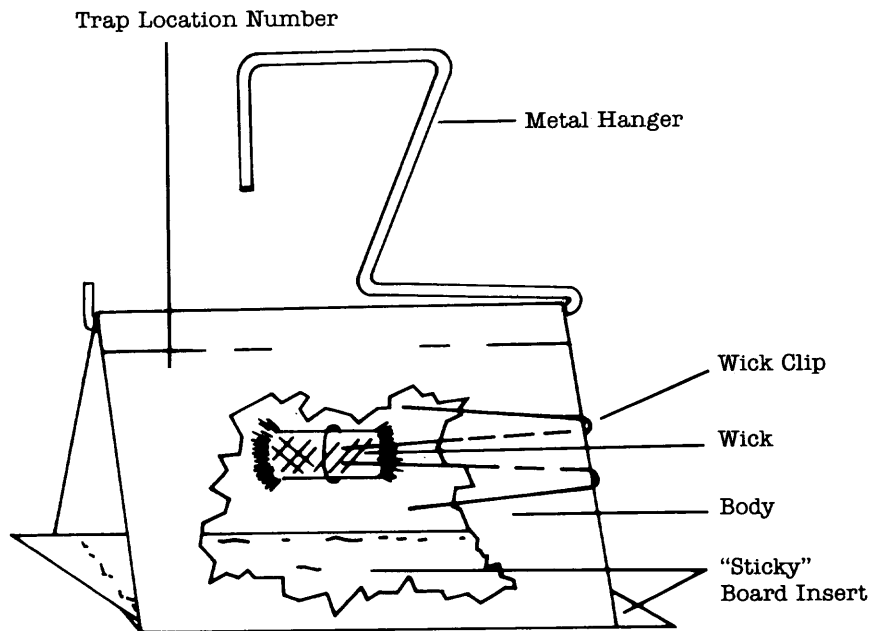
A Richmond dental wick capable of holding 6 ml of solution, 3/4 in in diameter and 1 in or 1 1/2 in long will be installed in the trap. The wick will be baited with a mixture of 99 percent methyl eugenol, and 1 percent naled by volume. The naled in the mixture will be 1 percent ai (Dibrom 14 @ 1 percent or Dibrom 8 @ 2 percent by volume). The initial servicing will require 6 mL (0.2 oz) of lure. Subsequent servicings will require adding sufficient lure to saturate the wick without dripping. A period of 8 weeks between rebaitings is optimum but will depend on lure evaporation under existing weather conditions. The following chart may be employed as a guide:

<u>Period</u>	<u>Temperature</u>	<u>Rebaiting Intervals</u>
Winter	50-60 °F Daytime Highs	12 weeks
Spring/Cool Summer	70- low-80 °F Daytime Highs	8 weeks
Hot Summer/ Hot Fall	90 °F and over Daytime Highs	4 weeks
Cool Fall	70- low-80 °F Daytime Highs	8 weeks

If a blowing rain should occur, all traps should be replaced as soon as possible due to contamination.

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**Jackson Trap**



The Jackson trap consists of five parts:

- trap body
- insert
- wick holder
- wick
- trap hanger



### 3. Quality Control

Field supervisors oversee each trapper's work. In addition to arranging schedules, helping with problems, and overall direction, the following quality control items are carried out:

a. Evaluation. The field supervisor periodically checks a number of traps run by each trapper. On an evaluation sheet the supervisor lists the trap number, location, description, and date and notes the condition of the wick, trap placement, and trapping schedule. Trappers are advised of results and problem areas worked out.

b. Trapping Directory--Map Requirement

(1) Trap Location Directory. A list of all trappers, traps, servicing dates, field supervisors, and a copy of each trap card giving the exact location of each trap is maintained in a directory.

(2) Map. A large-scale master map, gridded to the coordinates used in the survey, will be maintained and updated each day. The map will show the location of all traps and finds throughout the regulated area.

c. Initial Trap Training and Public Relations

(1) Trap placement

New trappers will be given individual instruction on proper trap placement.

(a) Selection of trapping sites. In selecting possible trap sites, consideration should be given to the availability of food and shelter near hosts with fruit. If two or more possible trap locations meet this criteria, preference should be given to the site that has a greater variety of hosts and shelter. In many cases, single trees will be the only host available and should be utilized. Never pick a location solely because it will look good on a map. For PFF, traps placed at the edges of orchards or in plants providing food and shelter have a higher likelihood of catching specimens than traps placed near the center. Placing a trap in a poor or second rate host, or even in a prime host without fruit when food and shelter or hosts with mature fruit

are available, has the effect of making the lure compete with natural attractants. In some cases, a very desirable host may be lacking in mature fruit or have insufficient shade for trap placement. In such cases, a nearby honeydew source is a desirable trap location. Generally, it is not advisable to place a trap in a host without fruit unless it shows evidence of abundant honeydew or possesses inflorescences. Both serve as a food source. Honeydew is a sweetish, clear excretion produced by certain insects such as aphids, scale insects, mealy bugs, and whiteflies. It is a good food source for adult fruit flies. A fungus called sooty mold lives on the honeydew. This mold turns the leaves on the tree black. The presence of sooty mold is an indication that the host is infested with insects that produce honeydew. Inflorescences possess nectar, on which the flies can also feed, and provide shelter during the heat of the day.

Those hosts which are likely to bear mature fruit and/or be attractive feeding/shelter sites for most of the year should form the bulk of the trapped hosts. The common guava and the mango are choice honeydew sources.

Trees having sparse foliage should be avoided when other protection is available. This is true especially during the summer months, since these trees do not produce enough shade. When a tree does not have sufficient shade, the trap should be placed in some other host or nonhost nearby.

Desirable trap sites should be noted on the Trap Location Record to facilitate future trap locations. This may be done at the time of initial trap placement or as the sites are noted during trap servicing.

(b) Placement of trap in host. Generally, it is not advisable to place a trap in a host without fruit except when the tree is being used as a trap site adjacent to a host which has insufficient shade.

The trap should be placed in a host or nonhost at a point high enough to be out of reach of children, livestock, or pets. It should be secured in a manner to prevent it from being blown down. During the summer or warmer portions of the year, the trap must be placed in open shade; whereas, in the winter or cooler time of the year, it should be placed in a southern exposure, but not in direct sunlight. It is preferable to place it 1/2 to 2/3 the distance from the trunk to the outer edge of the foliage.

The trap should not hang below or outside the foliage of the tree. The trap should not be placed in dense foliage that may protrude into the trap or give the fly a resting place that would prevent it from entering the trap.

It is desirable to have foliage below the level of the trap but not necessarily directly beneath the trap. A pole with a metal hook attached to one end can be used to place the trap sufficiently high in the host to be out of easy reach of children and curious adults.



**Correct**



**Incorrect**

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## (2) Public Relations

Good public relations are an important part of the survey specialist's duties. Trappers are constantly in view and frequently in contact with the public. They should be courteous at all times. Prolonged conversations should be avoided, but short, cordial conversations concerning work are desirable. Do not be drawn into arguments concerning program activities.

Survey Officers represent the U. S. Department of Agriculture and present an image of that Agency to the observing public. Dress, personal appearance, and actions should be appropriate to make a good impression with the general public.

Shorts and tee-shirts may not be worn. Long pants or slacks, and shirts or blouses with sleeves are prescribed for comfort and protection.

Shoes must be worn. Leather shoes with heavy soles help prevent punctures from nails and broken glass.

Identification badges must be worn every workday at chest level for easy identification.

When entering a property for the first time, always attempt to contact the property owner or caretaker, explain the work briefly, and ask permission to place the trap. In conversations with the public, traps should be referred to as "insect survey traps." If no one is home a "Memorandum to Property Owner or Tenant" should be left.

### (3) Preliminary Training

A vial of five dead, marked PFF (wing-clipped and color-marked) is sent to each field supervisor by registered mail. These are randomly placed on a Jackson trap insert and shown to all trappers. As part of the demonstration, the flies will be submitted for identification as described in normal operational procedures.

#### d. Quality Control Advisors

In a large program, quality control advisors may be employed. These personnel will monitor the trapping program. The advisor works with trappers assisting with proper trap location, baiting, host selection, trap deployment, and recordkeeping. Deficiencies and recommended improvements in the trapping district are reported to the field supervisor. Such reports are also given to the program manager. Periodic staff meetings of advisors are held to exchange viewpoints and discuss improvements.

#### e. PFF Quality Control Trapping Test Program

During the course of a large eradication program, it may be advisable to bait a selected number of traps with marked, dead PFF. This would maintain a high level of trapping awareness as well as ensure consistency in both trapping and reporting procedures. Previously killed and marked PFF will be obtained elsewhere and handled at project headquarters. The following procedure is suggested to minimize risk but actual procedures may vary, depending on agreement with State cooperators. Project managers will contact DEO for procedures to implement this test program.

#### (1) Trap Selection

Each field supervisor will randomly select 5 to 15 traps per trapper to be tested and provide all data to the program office at least 1 full week in advance of test date.

#### (2) Preparation

The field supervisor will be notified of the approximate delivery time of the specimens. Specimens will be selected and checked for color markings. As a precaution, the color will be changed each month, and the right or left wing will be clipped. Only the program office will be aware of the color and clipping schedule.

#### (3) Mailing

Each marked specimen will be placed in its own vial with a quality control identification number. The number will be recorded in a quality control log. The marked flies will then be sent by registered mail to the field supervisor. The field supervisor will send the program office a list of the traps to be baited for logging by specimen number. Specimens will be placed in traps no earlier than 1 day before normal servicing.

#### (4) Return

When a marked specimen is detected, standard trapping procedures are followed. However, the specimen is returned in the original vial, the pest detection report slip is given the quality control number under remarks, and the specimen is returned to the program office via registered mail.

#### (5) Oral Tests

To maintain trapper awareness, an occasional test may be given. General discussion may follow each test so that all concerned will benefit.

## Addendum E--Life History

### 1. SYSTEMATIC POSITION

Peach fruit fly, Dacus zonatus (Saunders) (Diptera, Tephritidae)

Class: Insecta  
Order: Diptera  
Family: Tephritidae

This is one of about 200 species of the genus Dacus. The genus is found from Africa to Australia and on the islands of the Pacific.

### 2. BIOLOGY

#### SUMMARY

The PFF is a strong flier and is active throughout the year, when temperatures exceed 50 °F. In India and Pakistan, adults appear in early spring and attack jujube, changing to loquat and peach by May-June, and then to cucurbits, mango, bael, citrus, guava, pomegranate and sapodilla for the rest of the year. The preoviposition period is 10 to 23 days. The female lays an average of 137 eggs in batches of two to nine under the rind of the host fruit. These hatch in 2-3 days. Larvae feed on the fruit for 1 to 3 weeks, then emerge to pupate 1-6 inches in the ground. The pupal period varies from 4 days in summer to over 6 weeks in winter. On the strength of published observations, PFF can apparently survive winters in temperate climates.

#### GENERAL

Adults of the PFF have been observed to mate in dim light in the laboratory, and during twilight in the field. Both males and females may mate several times, but the female may lay fertile eggs 2 to 7 days after mating throughout its life span. The preoviposition period, which also includes sexual maturation (8-16 days), is therefore 10 to 23 days to the first egg when the time for sexual maturity is included.

#### Eggs

The females lay white, elliptical eggs which taper at both ends. The eggs, similar to OFF, are 1.1 millimeter (mm) long and 0.2 mm wide and have a micropyle at one end. The PFF female punctures the chosen fruit with its

ovipositor and deposits 2-9 eggs within the fruit. The females lay eggs throughout the day but prefer to lay most of their eggs in the afternoon. The ovipositional punctures may serve to introduce microbial pathogens into the fruit, thereby causing the fruit to decay rapidly. The PFF can multiply rapidly in a suitable environment because the adult female can lay up to 93 eggs in 1 day, and as many as 564 in its lifetime. Under favorable conditions, the eggs hatch into larvae within 2 days. This incubation period may be delayed when temperatures are below normal.

### Larvae

The typical larva of the PFF is a creamy-white, legless maggot which feeds on fruit pulp and may grow to a length of about 7-10 mm within the fruit. The larval stage lasts about 4-16 days depending upon temperature. The larvae later drop to the ground through conspicuous holes in the fruit, for pupation in the soil. When disturbed the larvae double over and jump about. This phenomenon has also been observed under laboratory conditions and may be important for their dispersal.

### Damage

The larvae will normally destroy the interior of the fruit as they feed on the pulp. Further damage is done by the presence of the conspicuous, unsightly holes through which the larvae exit for pupation. This damage to the fruit is similar to that caused by the Mediterranean fruit fly (Medfly) and the melon fly.

The PFF has been reared from 33 fruits, a number of which are important crops.

### Pupae

Although soil is not necessary for pupation, the larva usually pupates within 1-6 inches of the soil surface, depending on soil texture and compactness. The typical pupa is encased in a dark-brown cylindrical puparium, about 5.0 mm long. This is the quiescent stage, lasting from 4 to 16 days in the summer, and according to the literature, up to 46 days in the winter. The adult fly emerges from the soil.

The life cycle may be completed in 20 days, under optimum conditions, but is prolonged by cool temperatures.

### Adults

The adult fly is about the size of a housefly. It is reddish brown, with yellowish abdominal crossbands and transparent wings with a small brown spot on the tip of each wing. The antennae are short, less than the vertical length of the head.

The newly emerged adult is not sexually mature and has little or no stored source of energy. Under favorable conditions, the fly attains sexual maturity within 8 (rarely 6) to 16 days and will produce several generations of progeny in a year.

The adult PFF feeds on honeydew, decaying fruits, plant nectar, and plant sap.

The average life span of the adult in the field will normally depend on the existence and presence of natural enemies, the nature and abundance of available food, and on weather conditions. Under laboratory conditions, life spans of 78 days have been recorded.

### Dispersal

During mark-recapture experiments, adult flies were recaptured 25 miles from their release sites. It can therefore, disperse very quickly into new areas in search of food and acceptable hosts for oviposition. Indications are that the PFF tends to remain in one area when adequate food and hosts are available. This suggests that a new infestation may be contained, in part, by preventing the artificial movement of infested produce from the area (as may be required by quarantine regulations). The dispersal of the PFF is affected not only by adult flight, but by the wind and by the movement of infested produce by man. For resting and feeding, adults disperse to trees or hosts with inflorescences or aphid infestations and visit hosts with suitable fruit primarily for oviposition purposes. During the hottest part of the day the adults hide in foliage, inflorescences, or other such places where temperatures are lower.





Addendum F--Identification of Specimen(s)

As many specimens as possible of the pest are to be collected for screening/identification by the local designated identifier.

Suspect adult specimens collected from Jackson traps should be handled carefully. To insure that specimens caught in sticky material can be accurately identified, the following procedures are recommended.

-Cut out a portion of the insert surrounding the specimen. This will leave you with the specimen imbedded in sticky material on a small piece of cardboard. Put an insect pin (number 2 size) through the cardboard and pin the cardboard (with specimen attached) in a mailmaster type pinning box. You are thus treating the specimen as a pinned specimen and do not need to use alcohol or other liquids. To ship the pinning box for identification place it inside a second shipping box and put padding between the two boxes.

-You may find it easier to submit the entire trap insert to the identifier. This eliminates the risk of breaking off critical body parts while removing a specimen from the insert.

Suspect larvae should be killed by placing in water, bringing to the boiling point, cooling, and then preserved in 70-75 percent ethyl alcohol. Suspect adult specimens collected from McPhail and Jackson traps and other insect stages should all be forwarded in vials of alcohol for confirmation to 1/ on the next page. These specimens must be accompanied by PPQ Form 391 marked "Urgent" (See PPQ Manual M390.500). Telephone the identifiers prior to shipping specimens to alert them of the shipment.

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INFORMATION FLOW FOR THE IDENTIFICATION OF SPECIMENS

SPECIMENS COLLECTED

SCREENING/IDENTIFICATION BY STATE OR PPQ

SPECIMENS SUBMITTED TO USDA 1/  
for Confirmation

CONFIRMATION NOTIFICATION 2/  
to Other USDA Agencies

RESULTS SENT TO APHIS AND IF EXOTIC  
Information Relayed to 3/ 4/

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- 1/ Arizona, Louisiana, Mr. D. Riley  
New Mexico, Texas PPQ, APHIS, USDA  
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- 2/ APHIS Plant Protection and Quarantine
- 3/ All States State and Territory Agricultural Regulatory Officials
- 4/ NAPPO North American Plant Protection Organization
-

Addendum G--Forms

	<u>Number</u>	<u>Title</u>
CONTROL	PPQ-213	Airplane Inspection Record
	PPQ-431-R	Treatment Test Record
	PPQ-468	Caution--Pesticide Treatment in Progress (Label)
	PPQ-552-R	Pesticide Samples for Chemical Analysis
	PPQ-602	Environmental Monitoring
	PPQ-603	Residue Sample for Food or Feed Product
	PPQ-802	Daily Aircraft Record
REGULATORY	PPQ-214	Warning Quarantine Label
	PPQ-244	USDA-APHIS Warning Quarantine (Tag)
	PPQ-254	Disposition of Plants and Plant or Animal Products
	PPQ-287	Mail Interception Notice
	PPQ-468	Caution--Pesticide Treatment in Progress (Label)
	PPQ-518	Report of Violation
	PPQ-519	Compliance Agreement
	PPQ-522	Certified Under All Applicable Federal or State Cooperative Domestic Plant Quarantines (Tag)
	PPQ-523	Emergency Action Notification
	PPQ-524	Issuance Record for Permits or Certificates
	PPQ-527	Certified Under All Applicable Federal or State Cooperative Domestic Plant Quarantines (Package Certificates)
	PPQ-530	Limited Permit
	PPQ-535	Certificate of Treatment (Fruit-Foreign Site)
	PPQ-537	Limited Permit (Movement of Non-certified Articles)
	PPQ-540	Certificate of Federal/State Domestic Plant Quarantines
	PPQ-551	Regulated Establishment Record
	PPQ-554	Certified Under All Applicable Federal or State Cooperative Domestic Plant Quarantine (Label)
PPQ-577	Phytosanitary Certificate	
SURVEY	PPQ-343	Trapping Record
	PPQ-345	Caution - Do Not Handle or Move (Warning Label used on Insect Traps)
	PPQ-391	Specimens for Determination
	PPQ-539	Trapping Survey Record



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Addendum I-References

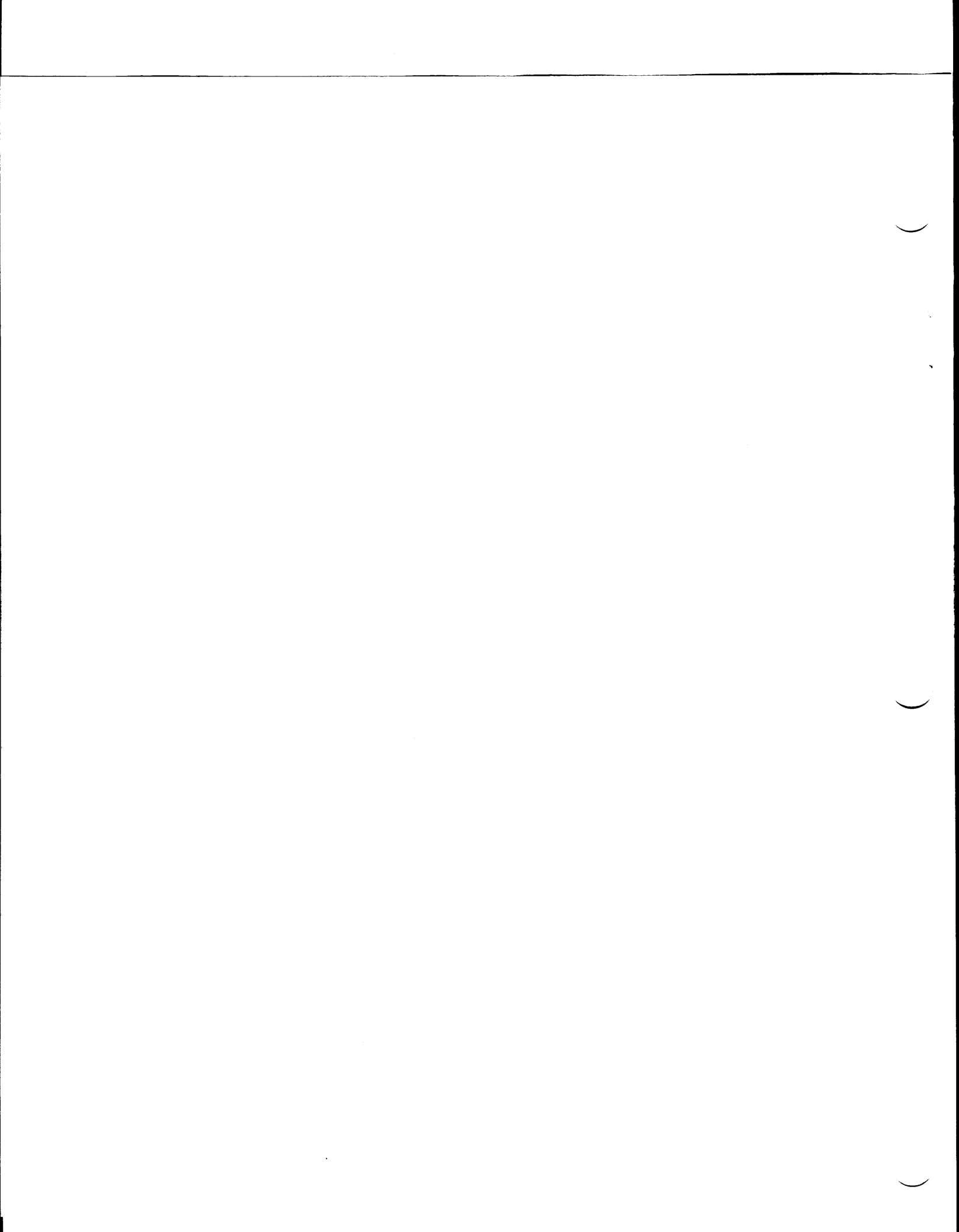
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