



United States Department of Agriculture

National Exotic Fruit Fly Detection Trapping Guidelines



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When using pesticides, read and follow all label instructions.

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Mediterranean fruit fly, *Ceratitidis capitata* (Wiedemann). Male Mediterranean fruit fly resting on a leaf. Scott Bauer. USDA-Agricultural Research Service, United States. 1317085. <http://www.bugwood.org>.

Introduction

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Introduction

Fruit flies in the family Tephritidae are among the most destructive, feared and well-publicized pests of fruits and vegetables around the world. The genera *Anastrepha*, *Bactrocera*, and *Ceratitis* pose the greatest risk to U.S. agriculture and are the focus of this manual. Tephritid fruit flies spend their larval stages feeding and growing in over 400 host plants. Introduction of these pest species into the United States causes economic losses from destruction and spoiling of host commodities by larvae, costs associated with implementing control measures, and loss of market share due to restrictions on shipment of host commodities. The extensive damage and wide host range of tephritid fruit flies become obstacles to agricultural diversification and trade when pest fruit fly species become established in these areas.

Scope and Purpose

The purpose of this manual is to improve and standardize decision making, training, and quality control for exotic fruit fly detection surveys.

This manual represents the currently accepted procedures for exotic fruit fly detection and includes well documented analyses, observations, and feedback from individuals with extensive experience in survey and control of exotic fruit fly infestations. It represents the minimum recommended trapping survey levels that should be conducted for the species listed.

This manual was drafted by a committee of State and Federal employees of plant protection and regulatory agencies. They utilized existing State fruit fly program protocols, publications, and their own experience to assemble a set of guidelines, which give flexibility, reliability, and economy for conducting exotic fruit fly detection surveys.

This manual includes procedures for baiting, placing, and servicing traps. It does not provide guidance on interpreting captures of exotic fruit flies and does not give triggers that should be used when deciding whether or not to initiate a control or eradication program. Nor does it provide guidance on issues that may vary locally, such as methods for disposing of trapping waste. For additional information regarding exotic fruit fly detection, control, and quarantine please contact your State Plant Health Director or your State Regulatory official. You may also visit the [APHIS Exotic Fruit Fly Website](#).

Users

The manual will be used by the following:

- ◆ All employees involved in exotic fruit fly surveillance, to explain the nature of survey activities to the general public
 - ◆ Managers, to plan and budget surveillance activities within their jurisdictions
 - ◆ Supervisors, to train, instruct, and provide standards for their employees
 - ◆ Trappers, as daily checklists and operational guides
-

Conventions

Conventions are established by custom and are widely recognized and accepted. Conventions used in the manual are listed in this section.

Advisories

Advisories are used throughout the manual to bring important information to your attention. Please carefully review each advisory. The definitions align with the America National Standards Institute (ANSI) and are in the format shown below.

CAUTION

CAUTION is used for tasks involving minor to moderate risk of injury.

DANGER

DANGEROUS is used in the event of imminent risk of death or serious injury.

NOTICE

NOTICE is used to alert a reader of important information or Agency policy.

WARNING

WARNING is used in the event of possible risk of serious injury.

Disclaimers

All disclaimers are located on the unnumbered page that follows the cover.

Table of Contents

Every chapter has a table of contents that lists the heading titles at the beginning to help facilitate finding information.

Control Data

Information placed at the top and bottom of each page helps users keep track of where they are in the manual. At the top of the page is the chapter and first-level heading. At the bottom of the page is the month, year, title, and page number.

Change Bar

A vertical black change bar in the left margin is used to indicate a change in the manual. Change bars from the previous update are deleted when the chapter or appendix is revised.

Footnotes comment on or cite a reference to text and are referenced by number. The footnotes used in the manual include general text footnotes, figure footnotes, and table footnotes. General text footnotes are located at the bottom of the page.

When space allows, figure and table footnotes are located directly below the associated figure or table. However, for multi-page tables or tables that cover the length of a page, footnote numbers and footnote text cannot be listed on the same page. If a table or figure continues beyond one page, the associated footnotes will appear on the page following the end of the figure or table.

Heading Levels

Within each chapter and section there can be four heading levels; each heading is green and is located within the middle and right side of the page. The first-level heading is indicated by a horizontal line across the page, and the heading follows directly below. The second-, third-, and fourth-level headings each have a font size smaller than the preceding heading level. The fourth-level heading runs in with the text that follows.

Hypertext Links

Figures, headings, and tables are cross-referenced in the body of the manual and are highlighted in boldface type. These appear in blue hypertext in the online guidelines.

Italics

The following items are italicized throughout the guidelines:

- ◆ Cross-references to headings and titles
- ◆ Names of publications
- ◆ Scientific names

Numbering Scheme

A two-level numbering scheme is used in the guidelines for pages, tables, and figures. The first number represents the chapter. The second number represented the page, table, or figure. This numbering scheme allows for identifying and updating. Dashes are used in page numbering to differentiate page numbers from decimal points.

Transmittal Number

The transmittal number contains the month, year, and a consecutively-issued number (beginning with -01 for the first edition and increasing consecutively for each update to the edition). The transmittal number is only changed when the specific chapter sections, appendixes, or glossary, tables, or index is updated. If no changes are made, then the transmittal number remains the unchanged. The transmittal number only changes for the entire guidelines when a new edition is issued or changes are made to the entire guidelines.

How to Find More Information

Contact the State Plant Health Director in the State or the National Policy Manager for fruit flies.

ADDRESS

John Stewart
National Fruit Fly Policy Manager
Telephone: (919) 855-7426
E-mail: John.C.Stewart@aphis.usda.gov
Web site: <http://www.aphis.usda.gov/plant-health/ff>

Introduction

How to Find More Information

Roles and Responsibilities

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Public Relations

All employees should have a good concept of public relations and understand the importance of public support for the program. The following guidelines apply to all employees:

- ◆ Be considerate of people and their property
- ◆ Display courtesy at all times
- ◆ Display safe and courteous driving habits
- ◆ Know the aims and purposes of the program and the reasons for the procedures and be able to explain it understandably to the public
- ◆ Maintain a good public image
- ◆ Make proper contacts with homeowner to explain the purpose of the fruit fly detection activities before trap placement
- ◆ Provide written program information such as a door hanger if available

Safety

All employees must be familiar with and follow all the Agency Safety Protocols and any additional safety precautions set forth in these trapping guidelines. The following list consists of some required procedures and is **not** all inclusive:

- ◆ Clean or dispose of PPE as soon as they become contaminated. If using Neoprene, wash with soap and water when contamination occurs.

Roles and Responsibilities

Headquarters Policy Management (PM)

- ◆ Use caution when entering a property to avoid dog bites and other avoidable injuries, such as damage to the eye by tree limbs, slip, trips and falls etc.
- ◆ Wear and maintain proper personal protective equipment (PPE) when handling liquid lures, pesticides, baited wicks, and plugs. This includes using disposable latex gloves at least 5 ml in thickness or Neoprene gloves when handling all liquid lures and wicks baited with liquid lures. Use safety goggles/face shield when pouring the liquid lures.
- ◆ When servicing traps at the vehicle, always work on the passenger side away from road traffic.

All employees are required to know and follow the Agency Vehicle guidelines. As a general rule, when using a government vehicle:

- ◆ Keep it clean and properly serviced.
- ◆ Keep the vehicle operating and maintenance report current and legible.
- ◆ Know that abuse of a government vehicle can lead to disciplinary action or dismissal.
- ◆ Know what to do in case of an accident.
- ◆ Use safe driving practices.

Headquarters Policy Management (PM)

The Policy Manager has the following responsibilities:

- ◆ Assures overall consistent implementation of fruit fly detection procedures and implements trapping policy updates to detection strategies and technology when they become available
- ◆ Assures that a quality assurance component is in place for detection tools and quality assurance of the overall program implementation
- ◆ Assures the National Fruit Fly Detection system is viable and that resources are applied appropriately; updates the national detection status map when required
- ◆ Requests appropriate reviews of the detection system
- ◆ Works closely with trade officials to assure that correct protocols are being utilized and that these are communicated appropriately to trading partners

Science and Technology (S&T)

The program methods development component (S&T) has the following responsibilities:

- ◆ Conducts field trials to assure trap and lure contract performance and quality assurance
- ◆ Develops new fruit fly detection tools and strategies for continued program improvement, including new traps and lures and new operational methods
- ◆ Makes recommendations to Policy and Management and Operations on fruit fly detection improvements
- ◆ Works with collaborators on the latest fruit fly detection technology that is being evaluated around the world

Field Operations (FOs)

The FOs are responsible for the following:

- ◆ Assures that operations are at the highest level of effectiveness and efficiencies
- ◆ Applies the appropriate resources as required
- ◆ Conducts periodic program evaluations in the field on program effectiveness
- ◆ Implements recommendations on new program tools
- ◆ Implements the fruit fly detection program throughout the United States based on standard protocols and approved detection guidelines
- ◆ Provides guidance to the field on trapping tools, supply purchases

State Government

State cooperators in Florida, Texas, and California are major components of the National Fruit Fly Detection System. These states have their own detection program guidelines and Action Plans that have more detail than the general national fruit fly detection guidelines due to the complexity of their diverse and large natural environments and industry components. State cooperators are part of the National Fruit Fly Trapping Committee and work closely with federal program components in all of the United States fruit fly states.

Responsibilities of states cooperators may include:

- ◆ Conduct primary detection

- ◆ Interface with their agricultural industries and serve as their primary contact
- ◆ Take the lead in implementing emergency response and eradication activities

Supervisors

Supervisors are responsible for all work being performed properly and in a timely manner. The following items need close attention:

1. Specific Orientation- supervisors should ensure that all employees are given thorough program training that provides an understanding of the following information:
 - ❖ Basic biology of target pest
 - ❖ Data Management
 - ❖ Economic impact of target pest introductions
 - ❖ Knowledge of the traps, proper trap placement, servicing schedules, and how they work
 - ❖ Limitations of the traps and trap contamination
 - ❖ Methods of potential introductions into the United States
 - ❖ Quality Assurance system in place
 - ❖ Recognition of the key pest insects
 - ❖ Safety
 - ❖ Understanding and implications of regulatory actions
2. Quality Assurance- Supervisors should perform quality control checks concerning work performances. Supervisors should accompany employees on a regular schedule and perform periodic unscheduled checks on employee's work. This may include the use of marked specimens.

It is important to explain to the employee how their work can be improved. It is equally important that an employee be informed of what they are doing well. This should be done in writing.
3. Safety- It is the supervisor's responsibility to instruct employees in the safe use and operation of all supplies and equipment, including vehicles. Supervisors should perform the following:
 - ❖ Background checks for driving offenses and licensing
 - ❖ Checks to ascertain that vehicles are operated safely
 - ❖ Checks to ensure that vehicles are maintained in a safe condition
 - ❖ Ensure employees complete Defensive Driving training

- ❖ Ensure that every trapper is aware of and adhering to all legal pertinent pesticide safety regulations and requirements, including the use of Personal Protective Equipment (PPE).
- ❖ Identify common hazards associated with yards commercial plantings.
- ❖ Periodic checks to ensure that employees are performing their functions in a safe manner
- ❖ Provide a list of emergency medical treatment centers to each employee

Trappers

Trappers are responsible for the following:

- ◆ Avoid contamination of traps and environs
- ◆ Be able to identify target insects and report suspect finds to your supervisor
- ◆ Keep accurate vehicle records
- ◆ Keep distribution maps current with accurate trap locations using GPS data
- ◆ Know and follow information in trapping protocol
- ◆ Know and follow proper procedures for handling, documenting, and submission of specimens
- ◆ Maintain equipment and supplies
- ◆ Maintain legible and timely service records as required and notation of possible hazards in the comment section of the property survey record
- ◆ Maintain proper trap densities and distribution
- ◆ Maintain trap records with accurate map drawings, trap locations, hosts, description
- ◆ Perform required trap relocations
- ◆ Place and service traps according to trapping protocol
- ◆ Properly dispose of trash, old traps, and components
- ◆ Quickly implement new policies and procedures
- ◆ Recognize host plants and know the relative host preference of target pest
- ◆ Remove all traps from the field at the end of the trapping season
- ◆ Run trap line with efficient route order and complete servicing route on schedule
- ◆ Use proper chain of command

Trapping Guidelines

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Trap Densities

Protection of domestic crops from invasion by exotic pests is an extremely important component of our agricultural system. Trap densities for a given geographical area will depend on a number of risk factors including:

- ◆ Availability of suitable hosts
- ◆ Climate conducive to the pest
- ◆ Evidence of potential pest pathways and risk function within a community or local area, such as:
 - ❖ Availability and demand for exotic fruits and vegetables

- ❖ Densely populated areas
- ❖ Ethnic make-up of a community, especially recent immigrants
- ❖ First class mail parcels from fruit fly infested areas, i.e. Hawaii, India etc.
- ❖ Frequent travel to fruit fly infested areas
- ❖ Gardening groups and clubs specializing in rare fruit propagation
- ❖ Historical detections from trapping records
- ❖ Major ports of entry (land, sea, air)
- ❖ Wholesale fruit and vegetable marketing centers and street vendors
- ◆ Location regarding altitude and topography
- ◆ Other program complementary activities, such as fruit sampling and Preventative Release Program (PRP)
- ◆ Trap/lure efficiency

Trap densities vary by the risk categories; the following guidelines are the minimum requirements for trap densities:

High Risk (ports of entry and urban or suburban areas)

- ◆ minimum of 10 traps per square mile based on availability of suitable trap sites and host trees for all trap/lure combinations

Medium Risk (other urban areas)

- ◆ minimum of 5 traps per square mile based on availability of suitable trap sites for all trap/lure combinations

Low Risk (rural areas)

- ◆ minimum of 1 trap per every 4 square miles based on availability of suitable trap sites for all trap/lure combinations

Marginal Risk (marginal environment suitability)

- ◆ minimum trap density of 1 trap per 5-10 square miles for all trap/lures combinations

Refer to [Table 3-1](#) for suggested trap densities depending on fruit fly genera. Trap densities are averaged from several guidelines: the International Atomic Energy Agency (IAEA), State and Federal protocols. Survey areas should be risk assessed to determine the appropriate trap density. Check with APHIS or State fruit fly program managers on what is appropriate based on funding and risk.

Table 3-1 Suggested Detection Trap Densities Per Square Mile

Fruit Fly Genera	Trap Type ¹	Attractant ²	Marginal Risk	Trap Density/Square Mile		
				Low Risk	Medium Risk	High Risk
<i>Anastrepha</i>	MLT/McP	2C/TY	1 per 5 sq. miles	1-2	2-5	5-10
<i>Bactrocera</i>	JT/MLT/McP	ME/CUE/TY	1 per 5 sq. miles	1-2	2-5	5-10
<i>Ceratitis</i>	JT/MLT/McP	TML/3C/TY	1 per 5 sq. miles	1-2	2-5	5-10

1 MLT = Multi-lure trap; JT = Jackson trap; McP = McPhail trap

2 2C = 2 component lure; 3C = 3 component lure; CUE = Cue lure; ME = Methyl eugenol; TML = trimedlure; TY = torula yeast

Trapping Equipment

Itemized below is a list of equipment useful in the placement and servicing of traps:

- ◆ Alcohol vials
- ◆ Buckets
- ◆ Calibrated medicine dropper or pipette
- ◆ Cellophane wrap
- ◆ Clipboard
- ◆ Dry vials
- ◆ Flagging tape
- ◆ Forceps
- ◆ Hand cleaner and paper towels
- ◆ Hand lens
- ◆ Insect Trapping Guidelines
- ◆ Pencils and pens
- ◆ Plastic bags for used traps, wicks and other garbage
- ◆ Pliers
- ◆ Pocket knife
- ◆ Property maps (*See [Trapping Property Map](#) on page B-3.*)
- ◆ Property records (*See [Property Survey Record \(05/1999\)](#) on page B-4 and [Property Survey Record \(08/2005\)](#) on page B-5.*)
- ◆ Public outreach material
- ◆ Rubber bands
- ◆ Safety equipment
- ◆ Scrub brushes
- ◆ Sharpie marker (or similar **permanent** marker)
- ◆ Six-foot pole with a hooked end and rubber grip for hanging traps
- ◆ Strainers
- ◆ Trap supplies
- ◆ Utility tray for carrying supplies

Trap Placement

Host Selection

The selection of a good host in which to place a trap at each trap location is one of the most important activities to maintaining an effective detection program. Priority should be given to hosts with mature fruit as listed in the host preference lists in [Appendix A Pest Information](#) of these Guidelines.

Traps should be placed in the upper two-thirds of the tree canopy on a strong branch, and one-half to two-thirds the distance from the trunk to the outer edge of the foliage. Hang traps within the tree canopy in open shade. Be sure that foliage and ripening fruit surround the trap, particularly at the bottom and sides, when possible. Do not place the trap in dense foliage that may block the entrance to the trap. During extremely hot weather, traps may need to be moved to other areas of the tree. Hang traps out of reach of people. (see [Figure 3-1](#).)

Before placing the trap at lower levels in a tree, consider security of the trap, as well as the safety of children.

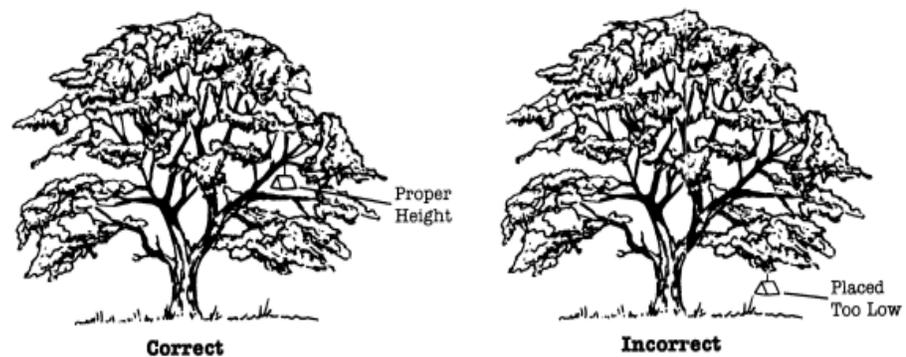


Figure 3-1 Trap Placement

Site Selection

Selection of a trap site depends on several criteria: status of the host tree and a trap distribution that represents the distribution of host material. Place traps in host trees that fit criteria for trap placement. Within those constraints, use the best host available. (See [Pest Information](#) on page A-1.) If there is a choice between two or more possible trap locations, preference should be given to the site with multiple hosts, either of the same or different varieties.

The amount of shade and shelter, particularly in hot weather, also influence host selection by fruit flies. If there is a host tree that contains fruit but is too small for proper trap placement, a trap may be placed in a nearby non-host tree

that provides proper height and shade. Trees in bloom and/or those with honeydew are preferred. Honeydew is a sweetish, clear excretion produced by certain insects such as aphids, scale insects, mealy bugs and whiteflies. When present it usually accumulates on the foliage and is a good food source for adult fruit flies. The presence of black sooty mold on the foliage is an indication that honeydew is present. Do not hang traps in trees that show signs of decline due to disease.

In urban areas, front yard hosts for trap placement are often selected over backyard hosts because of easier access for the trapper. This practice is not acceptable unless the best host is utilized. Favoring front yard hosts at the exclusion of better hosts that may be available in back yards may compromise earlier detection.

Trapping Season

Certain areas will be trapped year-round, and other areas may be trapped on a seasonal basis. Seasonal trapping cycles should be determined by detection history, seasonal fruiting of host plants, pathway analysis, and the target species of interest. Refer to the APHIS Fruit Fly [web site](#) for information about day-degree models. The following day-degree decision-making guidelines are provided:

- ◆ Seasonal temperature variations of some geographical areas proposed for exotic fruit fly detection indicates that traps may be removed during the coldest and/or hottest periods of the year.
- ◆ The following data could be gathered for any location being considered for trap removal:
 - ❖ Identify the window of time represented by the colder months, e.g., November through March, during which time fly development would be inhibited or hottest months of the year when adults cannot survive (United States Southwest).
 - ❖ Gather the average daily maximum-minimum temperatures for this period (several years data are preferred).
 - ❖ Determine the cumulative air and soil day degrees for this entire period for each species of fruit fly.
 - ❖ Obtain a day-degree model for each pest of primary concern. In the absence of values for a particular species, those for the most closely related species will be used.
 - ❖ Contact the PPQ or state fruit fly expert in the state or operational section for further guidance on trap initiation and removal for your state.

Trap Relocation

Computer modeling studies, empirical data from field experiments, and program experience all indicate that the sensitivity of a detection trapping system can be substantially enhanced by relocating trap sites on a regular basis. Relocation can compensate, at least partially, for a lure's limited range of attraction, and it provides trappers with an opportunity to adjust trap sites for seasonal changes in host phenology.

A trapping scheme should distribute traps among host material in a grid composed of one square mile units. Traps assigned to each one square mile unit should be relocated within that same square mile area as long as host material is present.

Relocate traps every 6 to 12 weeks. The minimum distance that a trap is moved at any given relocation is dependent in part on trap density. At 5 traps per square mile, a minimum relocation distance of 200 meters is appropriate but should be based on available hosts with ripe fruit as well. Always look for the best ripe host material in any given area for placement and relocations.

Trap Types

McPhail Trap

The McPhail (McP) trap is a glass trap with a water reservoir containing dissolved attractant compounds. Flies enter from below through the opening and drown in the solution. The trap has a rubber cork that seals the top of the trap and a wire hanger. Historically, the attractants or baits have consisted of proteinaceous liquids, such as dilute Nu-Lure® or torula yeast/borax tablets dissolved in water.

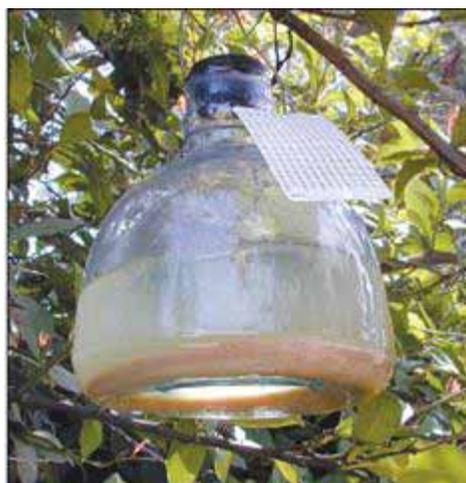
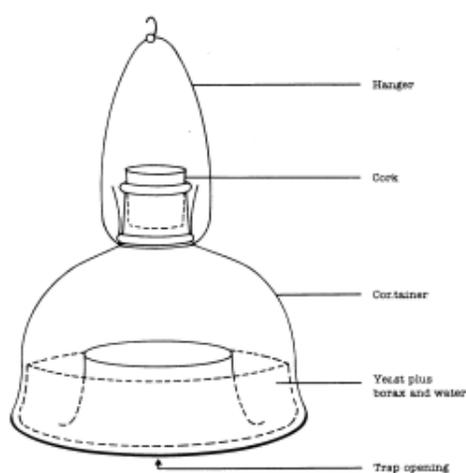


Figure 3-2 McPhail Trap

Trap Service

Follow these steps to service the McPhail trap:

Step 1:

Remove the trap from the tree, keeping it upright to avoid spillage.

Step 2:

Gently swirl the contents to catch flies that are alive and clinging to the inside of the glass in the air space above the water solution. Do this over a strainer.

Step 3:

Remove the stopper and pour the contents of the trap through the strainer that is held over a bucket. Any insects adhering to the trap should be removed and placed into the strainer. After the liquid has passed through, float the flies by submerging the strainer in a slightly larger white enamel pan of water. Softened and rolled wings, even if detached from fly bodies, will straighten out and be readily seen on the surface of the water.

Step 4:

Remove any picture-wing flies or other insects of potential interest from the strainer and place them into a vial or other container with 70% alcohol. The alcohol preserves the specimens.

Step 5:

Label the container with trap location, trap type, date, and any other pertinent information, and return the container to the local trapping supervisor or other designated person for screening and identification.

Step 6:

Clean contaminated traps before use. Transparency of the glass is important to attracting flies into the trap.

Step 7:

Avoid spilling bait since flies might be attracted to the material instead of entering traps.

Step 8:

Carry away old bait and wash water in a suitable container (five gallon bucket with lid) for proper disposal.

Care and Maintenance

Soak McPhail traps in a solution of trisodium phosphate (TSP) for 5 to 6 hours and brush clean. Lime-A-Way® can be used to clean any remaining calcium deposits. A large container such as a fifty-gallon drum would be ideal for soaking traps. Cleaning before winter storage insures a clean trap in the spring during the busy deployment period and will prevent the annual compounding of mineral deposits on the glass. For programs on a continuous schedule, traps should be rotated out-of-service for cleaning.

⚠ CAUTION

Muriatic acid can be used for hard-to-clean traps but proper protective equipment, such as a respirator, goggles, and gloves should be worn.

Muriatic acid can be purchased from swimming pool supply outlets and diluted 20-to-1 with water. Soak traps in a plastic drum for 30 minutes. Rinse and brush immediately after removal to reduce corrosion of the metal hanger wire. Save all neoprene corks.

Jackson Trap

The Jackson trap (JT) is a delta-shaped trap made of plastic-coated cardboard. The trap consists of five parts: trap body, sticky insert, wick holder or plastic basket, wick or solid lure, and trap hanger. Trap hangers are reusable and should be saved. A sticky insert on the bottom captures the flies.

This trap is mostly used with a combination of a para-pheromone and an insecticide. Two types of lure dispensers may be used. If the solid lure is used, it is contained in a plastic basket suspended from the inside of the Jackson trap (see [Figure 3-3](#)). The liquid lure is placed on a cotton wick supported inside the trap by a wire wick holder (see [Figure 3-4](#).)

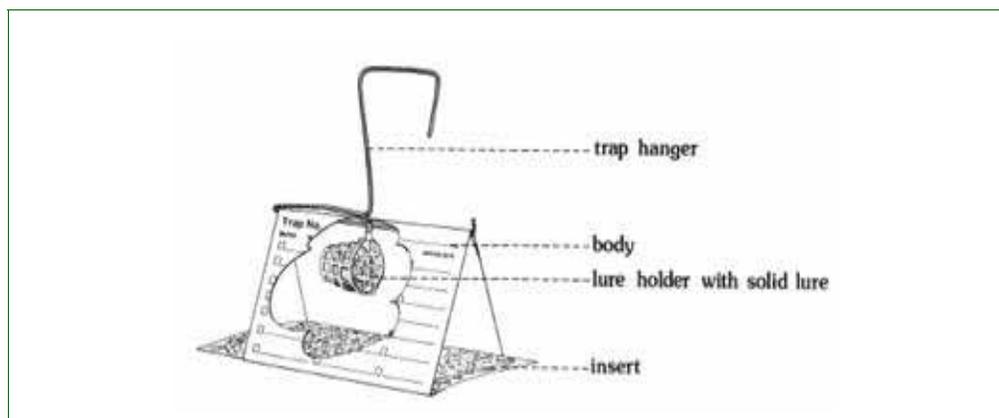


Figure 3-3 Jackson Trap Baited with Solid Lure in a Plastic Basket

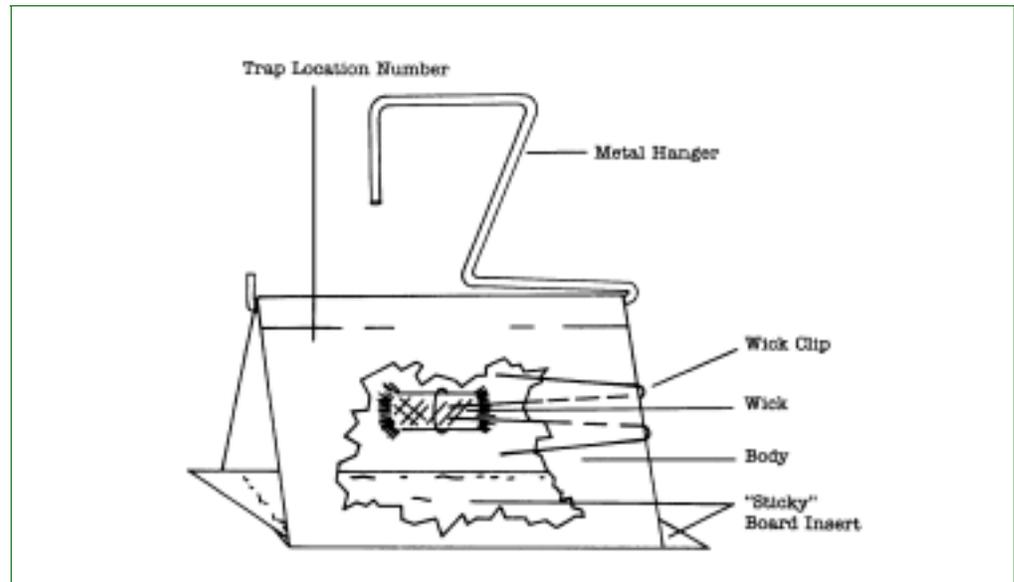


Figure 3-4 Jackson Trap Baited with Liquid Lure on a Cotton Wick

CAUTION

Be careful that the medicine dropper does not touch the sides of the trap when baiting.

Jackson Trap Assembly (Figure 3-5):

Step 1:

Insert the trap hanger at the top of the trap. Do not bend the hanger; it is brittle and will break easily.

Step 2:

Put a 90 degree bend in the wick holder 1 inch from the end. Insert the wick.

Step 3:

Insert the wick holder on the side of the trap, ensuring the wick does not touch the side wall and the wick is midway inside the trap. For solid lures, place the lure in the lure basket and slide the basket on to trap hanger. For liquid lures, insert wick holder.

Step 4:

Write the trap number on the non-sticky side of the insert. Make sure the sticky surface is good.

Step 5:

Bow the sticky side upward and insert in the trap. Number the trap body before hanging.

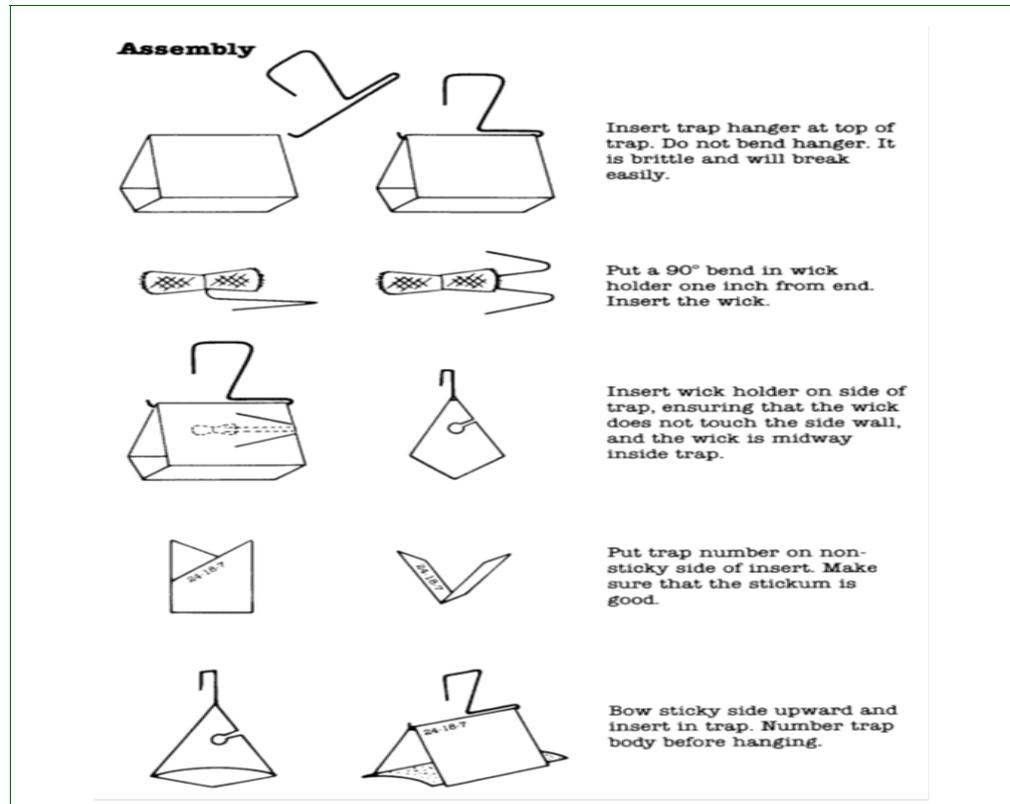


Figure 3-5 Jackson Trap Assembly

Jackson Trap Service

Step 1:

Remove the trap from the tree.

Step 2:

Pull out the insert and examine entire area of insert, including the bottom of insert. This step should be done before attending to other trap servicing details.

Step 3:

Remove leaves and debris from sticky board insert, since flies could be beneath these objects. Be certain that the sticky surface is not rendered less effective by dust or debris. The sticky board insert must remain optimally sticky to capture flies. When flies are detected on the sticky board insert, remove sticky board insert from trap body, wrap in clear cellophane, and mark date and trap identification.

Change inserts every 6 weeks during the baiting cycle of the trap or more often as needed. Always change the insert when relocating the trap. Insert must be identified by trap number as well for identification purposes.

As a general rule, cotton wicks or solid lures should be changed every 6 weeks. Water (moisture) can physically force the lure out of the wicks and contaminate the traps. Wicks that become wet from rain, sprinklers, etc., should be changed.

Trap bodies eventually lose their shape, become covered with trap servicing data, or otherwise deteriorate. When this occurs, they should be replaced.



Figure 3-6 Jackson Trap Baited with Plug

Multilure® Trap

Multilure® traps are plastic traps with an invagination in the bottom and a hole that permits entry of flies at the top of the invagination. The area around the invagination is typically filled with liquid. Flies that enter the trap fall into the liquid and drown. These trapping systems provide an alternative to standard McPhail traps or Jackson traps for use in detecting, delimiting, and monitoring populations of exotic fruit flies. Multilure® traps are used with proteinaceous baits, like the McPhail traps, and can also be used with the synthetic food baits.

The Multilure® trap also includes a receptacle that holds controlled-release cones or other devices and allows them to be added or changed without opening the trap. In addition, clips are available in the lid for holding sticky panels or panel-type release devices. There are other trapping systems that are very similar to the Multilure®, such as the Liquibator trap.



Figure 3-7 Multilure® Trap

Multilure® Trap Service

To service the Multilure®, trap, follow the instructions listed under the McPhail trap.

Care and Maintenance

Clean traps every 6 weeks when the bait and liquid propylene glycol are replaced or more frequently if necessary. The best cleaning method is to use a mild solution of GX 1027 (antibacterial soap) and water. Two teaspoons of GX 1027 in 5 gallons of water is sufficient. In some cases it may be necessary to soak the traps overnight to loosen sticky substances and debris. Rinse the traps thoroughly in clean water and wipe or air dry before reusing.

DO NOT USE CHEMICAL CLEANERS FOR REMOVAL OF THE STICKY SUBSTANCES. These products may act to deter flies and thus render the trap less effective.

Capture Agents

Propylene Glycol (PG) - preferred

Use propylene glycol (PG) solution with 3C, 2C, or proteinaceous lures in Multilure® traps. A 10 percent solution of PG (low-toxicity antifreeze) diluted in water has several advantages over borax. PG appears to preserve flies better than the borax, slows evaporation, and may even enhance the attractiveness of the lures. The PG solution must be replaced every 6 weeks when baiting or sooner if evaporation occurs.

Sticky Board

This trapping agent is used in the Jackson traps as inserts at the bottom (see [Figure 3-6](#)).

Attractants

Proteinaceous Baits

Proteinaceous baits are also known as natural food baits. These are usually combined with a preservative (Borax or low-tox antifreeze) and water in a liquid formulation. These baits capture both female and male fruit flies. They also tend to catch a wide range of non-target insects.

1) Torula Yeast (TY)/borax

Torula yeast comes in 5 gram pellets and includes borax. Prepare the attractant solution at the ratio of 1 pellet per every 100 ml of capture fluid (3 pellets/300ml per trap). This ratio produces a nice slurry that is attractive to fruit flies (normally not too thick or too thin).

NOTICE

Extra borax does not need to be added to the solution.

Torula yeast is used in McPhail traps as well. When baiting the trap, add water to a level just below the inside lip so that minor tilting will not cause spillage. This is important, since solution residue on the outside glass surface will leave a protein deposit that will discourage flies from entering the trap and drowning in the solution. Service and replace the bait weekly due to high nontarget insect captures and other contamination. During a response delimitation the torula should be allowed to activate for 3 days prior to initial servicing.

Para-pheromones

Para-pheromones are chemical compounds produced by plants that mimic the effect of insect pheromones. Para-pheromones have controlled release formulations providing a longer lasting attractant for field use. These lures are used with Jackson traps. When baiting a Jackson trap with one of these lures (except trimedlure), it is necessary to add insecticide to prevent flies from escaping. These lures act primarily as male attractants; however, when males are absent or present in low numbers, females may enter the trap.

1) Cuelure (CUE)

Keep CUE in a darkened bottle. A calibrated medicine dropper or a pipette is recommended for application of the lure to the wick. The wick is initially baited with 6 ml of lure. One-half of the lure is applied to each end of the wick (3/4" x 1"). Change wick every 6 weeks. **Reusing the wick is not recommended.** This lure contains 5 percent Naled active ingredient Dibrom® to ensure that flies are killed and held in the sticky board insert. The lure and toxicant are mixed by program staff and issued to trappers. If possible, baiting of new traps should be done at a work station where safety and contamination can be addressed more readily.

2) Methyl-eugenol (ME)

Keep ME lure in a darkened bottle. A calibrated medicine dropper or a pipette is recommended for application of the lure to the wick. The wick is initially baited with 6 ml of lure. One-half of the lure is applied to each end of the wick (3/4" x 1"). Wick should be changed every 6 weeks. This lure contains 1 percent Naled (active ingredient Dibrom®) to ensure that flies are incapacitated and held in the sticky board insert. Signal green pigment has been added as an identifying color.

CAUTION

Properly label CUE and ME lure containers with a poison label, dated, and stored properly out of reach of children and animals.

Use Latex or other protective gloves when handling lures and wicks containing Dibrom®.

Use safety goggles/face shield when mixing or pouring liquid lures.

Know and follow the product labels and MSDS.

3) Trimedlure (TML)

Trimedlure comes as a liquid or a solid lure. Both forms of TML are approved by the program; however, the solid polyplug is the recommended form. Plugs are formulated with 2 grams of TML; 1 plug per trap should be used and should be changed every 6 weeks. There is no insecticide in the lure. A reddish pigment has been added as an identifying color.

Synthetic Food Lures

Synthetic food lures are both female and male attractants and are more pest specific than the liquid proteinaceous baits.

1) 3-Component (3C)

Patches or Cone - The 3-Component lure (3C) consists of putrescine (P), ammonium acetate (A), and trimethylamine (T). For the patches, these compounds are formulated separately in sealed patches. Each patch has a circular membrane that controls the rate of release of the compound into the air. This lure is also available in unipack formulation that includes all the components in a single patch. Additionally, the lure is available in cone formulation. The only approved 3C lure formulation is the 3C patch or 3C cone.

2) 2-Component (2C)

Patches or Cone - The 2-Component lure (2C) consists of putrescine (P) and ammonium acetate (A). For the patches, these compounds are formulated separately in sealed patches. Each patch has a circular membrane that controls the rate of release of the compound into the air. This lure is also available in unipack formulation that includes both components included in a single patch. Additionally, the lure is available in cone formulation. The only approved 2C lure formulation is the 2C patch or 2C cone.

CAUTION

All three lure components, although exempt from EPA registration, can be irritating to eyes, skin, and the upper respiratory system. They emit toxic fumes if burned, consequently:

- *Bait traps outdoors in a well-ventilated area.
- *Use the packaging or tweezers whenever handling bait patches.
- *Dispose of spent bait patches or cones, daily.
- *Do not work inside MLMultilure® trap storage areas in order to avoid contamination of trap bodies.
- *Do not burn or store near flames. Evacuate the area in case of fire in storage area.
- *Do not open bait packages inside offices or vehicles, and do not store used traps in offices as they retain the bait odor. Spare used traps should be stored in watertight containers in the bed of a pickup truck or in a supply shed.

Baiting Synthetic Food Lures in Multilure® Traps

Patch Lures

Follow these steps to use the stick-on (patches) lures:

Step 1:

Carefully remove the protective cover of the lure patch and use it to press the patch against the inside surface of the trap top 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 (putrescine, FFA, and FFT, respectively). FFA and 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 (Figure 3-8 and Figure 3-9).

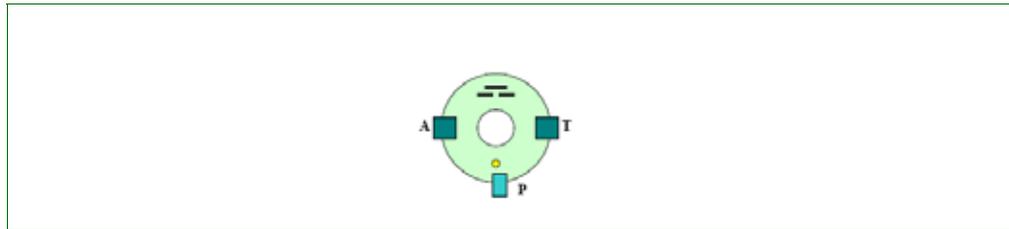


Figure 3-8 Patch Placement of 3C, Top View

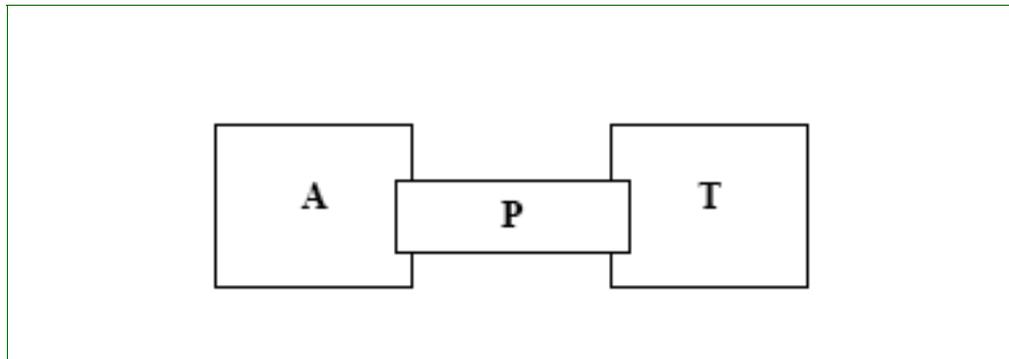


Figure 3-9 Patch Placement of 3C, Side View

Step 2:

Bait the trap with putrescine 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 clockwise, 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.

Step 3:

To assure that the A and T patches do not fall into the solution, keep the patches close enough to each other so that the A and T patches can be secured

with the P in the middle slightly overlapping the A and T patches. Do not cover or damage any of the open membranes.

Of the three patches, the P patch seems to have better adhesive properties, thus when applied in this manner it keeps the other patches from falling off into the liquid solution.

Clip-On Lures

Follow these steps to use the clip-on lures:

Step 1:

Remove outer envelopes on lure patches, if any.

Step 2:

Remove adhesive backing from the FFA and FFT patches.

Step 3:

Attach A to T back-to-back, crossing to adhesive strips.

Step 4:

Peel the cover off of the vertically aligned lure patch and adhere the FFP patch to the side of the vertical patch, being sure not to block any part of the open membrane.

Step 5:

Remove the remaining lure film covers.

Step 6:

Place the top edge of the 3-pack inside the fold of a plastic file folder tab or similar plastic material. Again, be careful not to block any portion of the membrane.

Step 7:

Grip the 3-pack by the file folder tab and insert it securely between the 3 plastic insert clips on the clear plastic Multilure® top.

Step 8:

Assemble the top and bottom, making sure the 3-pack does not block the entrance hole or touch the surface of the PG solution. Save the plastic file folder tab for reuse at each baiting.



Figure 3-10 Step by Step Baiting of 2C and 3C on Patches in Multilure®

Cones

Step 1:

Remove the yellow cap from the bait well at the top of the clear plastic upper half of the Multilure® trap.

Step 2:

Open the polyseal foil bag that contains the cone. The cone has a red plastic foot on one end.

Step 3:

Place the cone into the bait well, using the packaging, gloves or forceps to avoid touching the cone. Position the red plastic foot in first to avoid the bait from sticking to the bottom of the bait well.

Step 4:

Once the cone is in the well, replace the yellow lure cap on the bait well. Attach a hanger to the trap and position where needed.

Service Intervals



Figure 3-11 Step by step Rebaiting 2C and 3C Cones in Multilure®

Inspection Intervals

Inspect the traps every 1 to 3 weeks depending on risk and season when using ME, CUE, TML, 3C, and 2C. McPhail traps with torula yeast should be inspected weekly.

Baiting Intervals

Servicing intervals will have to be adjusted to local climate and temporal conditions. For example, periods of high winds or high temperatures will require more frequent servicing intervals than periods of calm weather or low temperatures. Replace the lures / bait and the trapping agent liquid, propylene glycol, at the same visit. In addition, check the trapping agent liquid at every inspection, replacing any evaporated or spilled liquid.

Table 3-2 Maximum Recommended Baiting Intervals

Season	Week Intervals					
	CUE	ME	TML	TY	2C	3C
Winter	6	6	6	1	6-8	6-8
Cool Spring-Summer (daytime highs of 70-80°F)	6	6	6	1	6-8	6-8
Hot Summer (daytime highs of 90°F)	4	4	4	1	6-8	6-8

Quality Assurance

Quality assurance should be an integral part of every trapping program and should be designed to improve the overall detection effort. All personnel given quality assurance assignments should be thoroughly knowledgeable of trapping guidelines and procedures. The following quality assurance systems are recommended:

- ◆ A quality assurance person periodically rides with the trapper and indicates where improvements can be made.
- ◆ A quality assurance person takes the trapper records and services the trap line by themselves. Any suggestions for improvement should be noted on the trap record by trap number.
- ◆ Blind random seeding of traps with marked specimens or tags can provide valuable information regarding how a specimen moves through the system from detection to identification to response.
- ◆ Specially dyed sterile fruit flies can be placed in a predetermined number of traps for QA purposes. All supervisors and trappers in the work station should be aware that this method of quality assurance is to be used.
- ◆ Specifically, mapping, trap placement and servicing, site and host selection, trap distribution in the area, density of traps required, trap relocation, safety, and record keeping should be monitored among other parameters.

Data Management

For surveillance systems to be fully effective, the use of standardized survey grids is essential. Use of standard survey grids simplify mapping and enhances computer-generated map capabilities and database management systems. Sophisticated navigational aids and geographical information systems play an important role in making pest surveys more effective and efficient. Global Positioning System (GPS) navigational aids are revolutionizing position locator capabilities utilizing latitude/longitude (lat/long) coordinates.

Any grid overlay may be used within the lat/long projections on a map to locate projected trap sites for detection survey purposes (ideal location will depend on host availability). The map and matching grid overlay would, preferably, utilize a one square mile framework for ease of use. Additionally, field use of a GPS receiver gives latitude/longitude (lat/long) coordinates for each trap placement, can be incorporated into a computer based mapping program to plot the entire trapping area (county & state). In the absence of or until a GPS receiver is available, the current use of a property or trap record card locating the trap by software program or street address will enable

physical insertion of lat/long coordinates. (See *General Information* on page B-1.) The Cooperative Agricultural Pest Survey (CAPS) stresses the use of lat/long data for the following reasons:

- ◆ Accuracy
- ◆ Effective data management
- ◆ Effective mapping
- ◆ Reproduction capability
- ◆ Uniformity

Detailed trapping information is generally kept on a Property Survey Record (See *General Information* on page B-1.) or trap record. This provides recorded information regarding the exact location of the trap. It also includes servicing, relocation and baiting history. Individual states may have their own form. However, any trap record should include the following information;

- ◆ A history of trap inspection and baiting, including dates, inspector, specimens found, and samples submitted
- ◆ An identification number for each trap
- ◆ The exact location of each trap, i.e., county, city, address, mapped location on property and host the trap is located in

Trapping books, maps, specimen submission data, etc., must be accurate. Legible city and county wall maps depicting the distribution of each trap type must be kept. Experience has shown that inaccurate or insufficient records can create additional problems.

When recording trap information give close attention to the following details:

- ◆ Always denote the city and county.
- ◆ Always use pencil for trap card entries.
- ◆ Draw property diagram maps with “north” toward the top border. Indicate north on each map with an N”.
- ◆ Include a written description of the location of each trap on the property. A more detailed description will be needed for those locations that are not easily found.
- ◆ Label the street name where the trap is placed, as well as at least one close cross street. Always denote “street”, “drive”, “avenue”, etc.
- ◆ Name the host type, e.g. orange, and mark its approximate location on the property.
- ◆ Never run a trap line without the trapbook / trap cards.

- ◆ Record trap information immediately after inspection or baiting in the field. Do not wait until a later time to record data.
- ◆ Sketch recognizable landmark structures and distances in undeveloped areas or when an address is not available.
- ◆ Sketch recognizable structures on the property where the trap is placed.
- ◆ Update records when a trap is relocated or host changed.
- ◆ Utilize the IPHIS Fruit fly complex or other approved detection data base system when managing fruit fly records.

Specimens Management

Trappers should collect and submit any suspect flies, especially those with patterned or picture wings for identification. Follow the specific guidelines outlined by your state program and according to National Identification Services (NIS) guidelines.

Pest Information

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Introduction

The information presented for fruit flies is the best known information at this time. Papers are constantly being published that contain new information about the biology, distribution, and host range of fruit flies. For the most up-to-date information, consult the APHIS PPQ S&T Compendium of Fruit Fly Host Information (CoFFHI) group. Authorized users can access the Compendium of Fruit Fly Host Information at <https://coffhi.cphst.org/>.

Mexican Fruit Fly (*Anastrepha ludens*)

The Mexican fruit fly (*Anastrepha ludens*) (Mexfly) is a serious pest of citrus and mango in northeastern Mexico. Since 1893, Mexfly has spread throughout Mexico and into Central America. It is known to be a recurrent pest in the United States only in Cameron, Hidalgo and Willacy Counties in southern Texas, but undergoes eradication efforts whenever detected.

APHIS and cooperators maintain survey, regulatory, and control programs, including grove inspection, spray applications, trapping, fruit fumigation, and the certification of fruit shipped interstate. An established infestation of Mexfly could severely harm production and marketability of domestic citrus fruits, causing significant industry losses.

The Mexican fruit fly destroys many types of fruit, including oranges, grapefruits, peaches, and pears. Female fruit flies lay their eggs in pieces of fruit. The eggs hatch into larvae that eat the flesh of the fruit, causing it to rot. These flies could cause billions of dollars' worth of damage if they became established in the United States.

General Biology

The adult is slightly larger than a housefly and is mostly yellowish-brown in color. The Mexican fruit fly, *A. ludens*, is typical in appearance to other members of the genus *Anastrepha*, but notable for the female's long ovipositor and sheath relative to its body size. The ovipositor is 3.35-4.7 mm long. The Mexican fruit fly is readily distinguished from the Caribbean fruit fly, *Anastrepha suspensa*, by its much longer ovipositor (only 1.45-1.6 mm long in *suspensa*), wing band color (pale yellow in *ludens* vs. dark brown in *suspensa*), width of S-band (narrow apically, not extending to medial vein in *ludens* vs. wide and extending to medial vein in *suspensa*), and color of thoracic setae (uniformly pale in *ludens* vs. dark in *suspensa*).

Under varied laboratory conditions, Mexfly mated 9-25 days after they emerged and began to lay eggs a few days later. Eggs hatched in 4-7 days, and the larvae developed in 9-35 days. Pre-pupal and pupal stages in the soil lasted 16-32 days. In nature the average life cycle takes about 3 months with three generations developing annually. There can, however, be up to 12 generations a year. The Mexfly female punctures the rind or skin of fruits and vegetables and inserts 2-10 eggs. A single female may produce several hundred eggs. Larvae pupate 3-5 cm deep in the soil.

Preferred Trap and Lure

Multilure® (2 component) or McPhail trap with torula yeast



Source: Florida Division of Plant Industry Archive, Florida Department of Agriculture and Consumer Services
UGA5193047 <http://www.bugwood.org>

Figure A-1 Mexican Fruit Fly (*Anastrepha ludens*)

Distribution

Mexfly occurs in Argentina, Belize, Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama. It has been detected in Texas frequently, but is eradicated. This species is subtropical rather than tropical, and in Central America its range extends southward only at higher elevations.

Pest InformationMexican Fruit Fly (*Anastrepha ludens*)**Table A-1 Host List for *Anastrepha ludens***

Scientific Name	Common Name
<i>Anacardium occidentale</i> L.	cashew
<i>Annona cherimola</i> Mill.	cherimoya
<i>Annona reticulata</i> L.	bullock's heart
<i>Annona squamosa</i> L.	custard apple
<i>Capsicum pubescens</i> Ruiz & Pav.	manzano
<i>Carica papaya</i> L.	papaya
<i>Casimiroa edulis</i> La Llave & Lex	white sapote
<i>Casimiroa greggii</i> (S. Watson) F. Chiang	yellow chapote fruit
<i>Casimiroa</i> spp.	sapote
<i>Citrus aurantiifolia</i> (Christm.) Swingle ¹	lime
<i>Citrus aurantium</i> L.	sour orange
<i>Citrus deliciosa</i> Ten.	Mediterranean mandarin,
<i>Citrus limetta</i> Risso	sweet lemon
<i>Citrus limon</i> (L.) Burm.f. ²	lemon
<i>Citrus maxima</i> (Burm.) Merr.	pummelo
<i>Citrus medica</i> L.	citron
<i>Citrus meyeri</i>	Meyer lemon
<i>Citrus paradisi</i> Macfad.	grapefruit
<i>Citrus reshni</i> hort. ex Tanaka	Cleopatra mandarin,
<i>Citrus reticulata</i> Blanco	clementine
<i>Citrus reticulata</i> x <i>Fortunella</i>	calamondin orange
<i>Citrus sinensis</i> (L.) Osbeck	orange
<i>Citrus x tangelo</i> J. W. Ingram & H.E. Moore	tangelo
<i>Coffea arabica</i> L.	coffee
<i>Cydonia oblonga</i> Mill.	quince
<i>Diospyros kaki</i> Thunb.	persimmon
<i>Inga jinicuil</i> G. Don	jinicuil
<i>Inga micheliana</i> Harms	chalum
<i>Malus pumila</i> Mill.	paradise apple
<i>Malus sylvestris</i> (L.) Mill.	wild apple
<i>Mammea americana</i> L.	mamey
<i>Mangifera indica</i> L.	mango
<i>Passiflora edulis</i> Sims	purple granadilla
<i>Persea americana</i> Mill. ³	avocado
<i>Prunus americana</i> Marshall	plum
<i>Prunus armeniaca</i> L.	apricot
<i>Prunus domestica</i> L.	plum
<i>Prunus persica</i> (L.) Batsch	nectarine/peach

Table A-1 Host List for *Anastrepha ludens* (continued)

Scientific Name	Common Name
<i>Prunus persica</i> (L.) Batsch var. <i>nucipersica</i> (Suckow) C.K. Schneid.	nectarine
<i>Prunus salicina</i> Lindl.	Japanese plum
<i>Psidium cattleianum</i> Sabine var. <i>littorale</i> (Raddi) Fosberg	strawberry guava
<i>Psidium guajava</i> L.	guava
<i>Punica granatum</i> L.	pomegranate
<i>Pyrus communis</i> L.	pear
Sapotaceae	sapota, sapodilla
<i>Sideroxylon capiri</i> (A. DC.) Pittier subsp. <i>tempisque</i> (Pittier) T.D. Penn.	jungleplum
<i>Spondias purpurea</i> L.	purple mombin
<i>Spondias</i> spp.	Spanish plum
<i>Syzygium jambos</i> (L.) Alston	rose-apple

- 1 Sour limes are not regulated articles for Mexfly.
- 2 Eureka, Lisbon and Villa Franca cultivars (smooth-skinned sour lemon) are not regulated articles for Mexfly.
- 3 Commercially produced Hass avocado from Mexico is not a host of Mexfly.

South American Fruit Fly (*Anastrepha fraterculus*)

South American fruit fly (*A. fraterculus*) is a serious pest of cultivated fruits in many parts of South America and is apparently the most injurious species of the genus *Anastrepha*. In Argentina it is considered to be the most important pest in all citrus areas. It attacks many fruits as well as vegetables and nuts.

General Biology

South American Fruit Fly adults are about 12 mm long. The female has a stout ovipositor somewhat shorter than the abdomen. Wing spread is 25 mm. The body is rust yellow or brownish yellow with three sulfur yellow stripes on the thorax. Wings have a variable yellow brown pattern on a clear base.

The life cycle of the South American Fruit Fly varies considerably by season as well as by region. Up to 50 eggs may be oviposited in a single fruit. Adults live about a month. The egg stage lasts about 3 days in summer and 6 days in winter. Larval development is completed in 15-20 days in summer and up to 25 days in winter. In exceptional cases, adults have been known to emerge from pupae after 12, 14, and 18 months.

Pest Information

South American Fruit Fly (*Anastrepha fraterculus*)

Preferred Trap and Lure

Multilure® (2 component) or McPhail trap with torula yeast



Figure A-2 South American Fruit Fly (*Anastrepha fraterculus*)

Distribution

South American fruit fly occurs in Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Tobago, Trinidad, Uruguay, and Venezuela. South American fruit fly has been detected in the United States but is not established there. The populations north of the equator may be a species complex, not the true South American Fruit Fly.

Table A-2 Host List for *Anastrepha fraterculus*

Scientific Name	Common Name
<i>Anacardium occidentale</i> L.	cashew
<i>Annona mucosa</i> Jacq.	wild sweetsop
<i>Butia eriopatha</i> (Mart. Ex Drude) Becc.	wooly jelly palm
<i>Byrsonima crassifolia</i> (L.) Kunth	craboo
<i>Campomanesia</i> sp.	
<i>Citrus paradisi</i> Macfad.	grapefruit
<i>Citrus sinensis</i> (L.)	orange
<i>Eriobotrya japonica</i> (Thunb.) Lindl.	loquat
<i>Eriobotrya involucrata</i> DC.	cherry-of-the-Rio Grande
<i>Eriobotrya pyriformis</i> Cambess.	uvalha
<i>Eriobotrya</i> sp.	

Table A-2 Host List for *Anastrepha fraterculus*

Scientific Name	Common Name
<i>Eugenia uniflora</i> L.	Surinam cherry
<i>Mouriri acutiflora</i> Naudin	Flor de mosquito amarillo
<i>Prunus avium</i> (L.) L.	sweet cherry
<i>Prunus domestica</i> L.	plum
<i>Psidium guajava</i> L.	guava
<i>Psidium</i> sp.	
<i>Psidium guineense</i> Sw.	Brazilian guava
<i>Spondias mombin</i> L.	hog-plum
<i>Syzygium jambos</i> (L.) Alston	jambos

West Indian Fruit Fly (*Anastrepha obliqua*)

West Indian fruit fly adults are very difficult to separate from South American fruit flies, as they have similar coloring and patterns (See [South American Fruit Fly \(*Anastrepha fraterculus*\)](#) on page A-5.) Specimens should be referred to a specialist, as dissection of the aculeus (ovipositor piercer) on a female may be necessary to confirm identification.

General Biology

West Indian fruit flies lay eggs beneath the skin of host fruits, where the eggs hatch within 3-12 days. Larvae feed for another 15-32 days and then pupate in the soil for 15-19 days (longer in cool temperatures) before emerging as adults. Adults occur throughout the year.

Pest Information

West Indian Fruit Fly (*Anastrepha obliqua*)

Preferred Trap and Lure

Multilure® (2 component) or McPhail trap with torula yeast



Source: Jeffrey W. Lotz, Florida Department of Agriculture and Consumer Sciences. UGA5194002
<http://www.bugwood.org>

Figure A-3 West Indian Fruit Fly (*Anastrepha obliqua*)

Distribution

West Indian fruit fly occurs in Argentina, Bahamas, Barbados, Belize, Brazil, British Virgin Islands, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guadeloupe, Guatemala, Guyana, Haiti, Honduras, Jamaica, Martinique, Mexico, Montserrat, Netherlands Antilles, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Saint Kitts-Nevis, Saint Lucia, Suriname, Trinidad and Tobago, Venezuela and the Virgin Islands of the United States. Distributions are restricted in Mexico and Paraguay. West Indian fruit fly has been detected in the Bermuda Islands, but is no longer present; the fly has been detected in the United States, but has been eradicated.

Table A-3 Host List for *Anastrepha obliqua*

Scientific Name	Common Name
<i>Anacardium occidentale</i> L.	cashew
<i>Averrhoa carambola</i> L.	carambola, country gooseberry
<i>Brosimum alicastrum</i> Sw.	ramo'n
<i>Diospyros</i> spp.	sapote
<i>Dovyalis hebecarpa</i> (Gardner) Warb.	kitembilla
<i>Eriobotrya japonica</i> (Thunb.) Lindl.	loquat
<i>Malpighia glabra</i> L.	Barbados cherry
<i>Mangifera indica</i> L.	mango
<i>Manilkara zapota</i> (L.) P.Royen	chiku sapodilla
<i>Passiflora edulis</i> Sims	passionflower, passionfruit, yellow lil- ikoi
<i>Passiflora quadrangularis</i> L.	giant granadilla
<i>Prunus persica</i> (L.) Batsch	peach
<i>Prunus salicina</i> Lindl.	Japanese plum
<i>Psidium acutangulum</i> DC	
<i>Psidium cattleyanum</i> Sabine var. <i>littorale</i> (Raddi) Fosberg	red strawberry guava
<i>Psidium guajava</i> L.	guava
<i>Pyrus communis</i> L.	pear
<i>Spondias dulcis</i> Sol. ex Parkinson	otaheite apple, jew plum
<i>Spondias mombin</i> L.	hog-plum
<i>Spondias purpurea</i> L.	red mombin
<i>Syzygium jambos</i> (L.) Alston	rose apple
<i>Syzygium malaccense</i> (L.) Merr. & L.M. Perry	mountain apple, Malay apple

Sapote Fruit Fly (*Anastrepha serpentina*)

General Biology

Sapote fruit flies have a body length of 7.5 – 10.3 mm with darker body markings, predominantly black or orangish to brown. Sapote fruit fly is the only *Anastrepha* species that lacks the V-band (inverted V-shaped band across crossvein dm-cu and doubling back across vein M). Instead, the V-band is reduced to a marking along crossvein dm-cu. Sapote fruit flies have a long ovipositor.

Pest Information

Sapote Fruit Fly (*Anastrepha serpentina*)

Sapote fruit flies lay eggs under the skin of host fruits, where eggs hatch after 3 days and larvae feed for an additional 8-13 days. Larvae pupate in the soil for 13-17 days before emerging as adults.

Preferred Trap and Lure

Multilure® (2 component) or McPhail trap with torula yeast

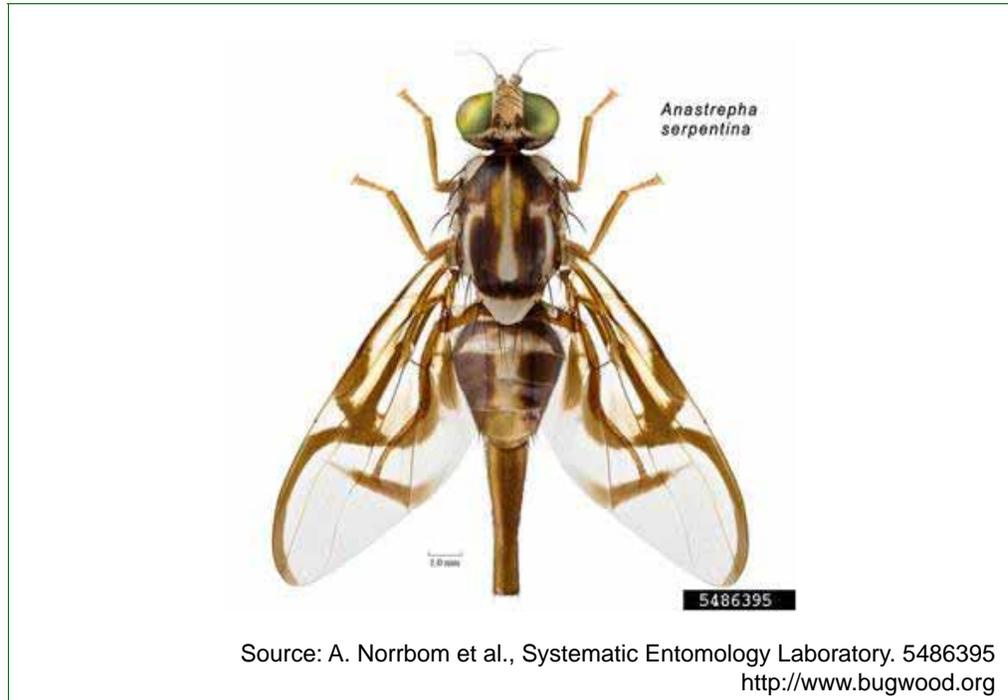


Figure A-4 Sapote Fruit Fly (*Anastrepha serpentina*)

Distribution

Sapote fruit fly occurs in Argentina, Belize, Brazil, Colombia, Costa Rica, Curacao, Dominica, Ecuador, El Salvador, French Guiana, Guatemala, French Guinea, Guyana, Honduras, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Suriname, Trinidad and Tobago and Venezuela. Sapote fly is occasionally detected in the United States; these detections are always eradicated.

Table A-4 Host List for *Anastrepha serpentina*

Scientific name	Common name
<i>Annona glabra</i> L.	alligator apple
<i>Averrhoa carambola</i> L.	carambola
<i>Byrsonima crassifolia</i> (L.) Kunth	craboo
<i>Chrysophyllum cainito</i> L.	star-apple
x <i>Citrofortunella mitis</i>	
<i>Citrus</i> spp.	citrus

Table A-4 Host List for *Anastrepha serpentina* (continued)

Scientific name	Common name
<i>Cydonia oblonga</i> Mill.	quince
<i>Diospyros digyna</i> Jacq.	black sapote
<i>Diospyros</i> spp.	sapote
<i>Dovyalis hebecarpa</i> (Gardner) Warb.	Ceylon gooseberry
<i>Malus sylvestris</i> (L.) Mill.	apple
<i>Mammea americana</i> L.	mammee apple
<i>Mangifera indica</i> L.	mango
<i>Manilkara zapota</i> (L.) P. Royen	sapodilla
<i>Persea americana</i> Mill.	avocado
<i>Planchonella obovata</i> (R. Br.) Pierre	black-ash
<i>Pouteria caimito</i> (Ruiz & Pav.) Radlk.	caimito
<i>Pouteria campechiana</i> (Kunth) Baehni	eggfruit tree
<i>Pouteria torta</i> (Mart.) Radlk.	
<i>Pouteria viridis</i> (Pittier) Cronquist	
<i>Prunus persica</i> (L.) Batsch	peach
<i>Psidium guajava</i> L.	guava
<i>Pyrus communis</i> L.	pear
<i>Sideroxylon sebolana</i>	
<i>Spondias mombin</i> L.	mombin
<i>Spondias purpurea</i> L.	purple mombin

Guava Fruit Fly (*Anastrepha striata*)

General Biology

Guava fruit fly adults are small to medium sized (wing 5.9-7.7 mm long) and yellow brown, with a black-patterned thorax. Guava fruit flies are distinguishable by the combination of a U-shaped dark pattern on the scutum and a short aculeus that lacks apical serrations.

There is little specific information available on the life cycle of guava fruit flies. *Anastrepha* species lay eggs beneath the skin of host fruits, where eggs hatch within 3-6 days. Larvae feed on the fruit for another 15-20 or 20-25 days, depending on temperature, before pupating in the soil. Adults emerge after 15-19 days (longer in cool temperatures). Adults occur throughout the year.

Pest Information

Guava Fruit Fly (*Anastrepha striata*)

Preferred Trap and Lure

Multilure® (2 component) or McPhail trap with torula yeast

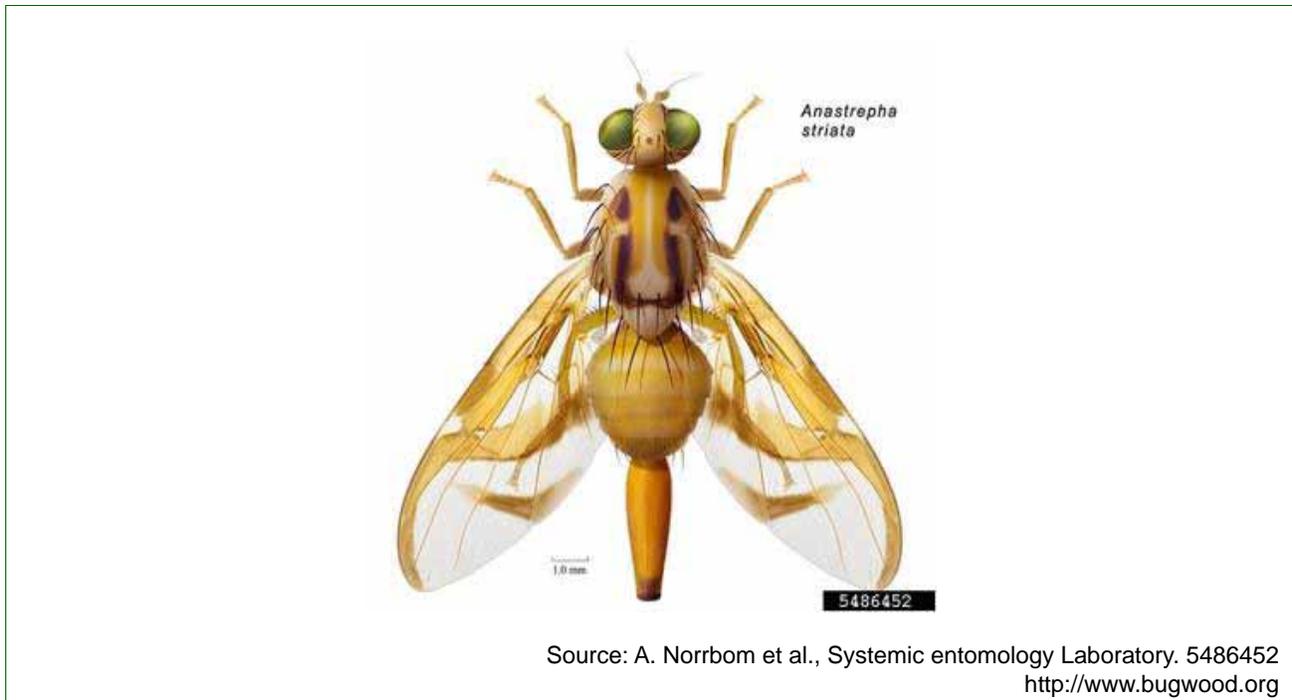


Figure A-5 Guava Fruit Fly (*Anastrepha striata*)

Distribution

Guava fruit fly occurs in Belize, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, El Salvador, French Guiana, Guatemala, Guyana, Honduras, Mexico, Netherlands, Netherlands Antilles, Nicaragua, Panama, Peru, Suriname, Trinidad and Tobago and Venezuela. The species is occasionally detected and eradicated from the United States.

Table A-5 Host List for *Anastrepha striata*

Scientific Name	Common Name
<i>Anacardium occidentale</i> L.	cashew
<i>Annona mucosa</i> Jacq.	wild sweetsop
<i>Artocarpus heterophyllus</i> Lam.	jackfruit
<i>Attalea phalerata</i> Mart. Ex Spreng.	urucuri palm
<i>Averrhoa carambola</i> L.	carambola
<i>Bellucia dichotoma</i> Cogn.	red goiaba-de-anta
<i>Bellucia grossularioides</i> (L.) Triana	goiaba-de-anta
<i>Bellucia pentamera</i> Naudin	coronillo
<i>Byrsonima crassifolia</i> (L.) Kunth	nance
<i>Byrsonima</i> sp.	muruci
<i>Campomanesia cornifolia</i>	
<i>Campomanesia lineatifolia</i> Ruiz & Pav.	guabiroba
<i>Carica papaya</i> L.	papaya
<i>Caryocar glabrum</i> (Aubl.) Pers.	bat's souari
<i>Chrysobalanus icaco</i> L.	coco-plum
<i>Chrysophyllum cainito</i> L.	star-apple
<i>Citrus aurantium</i> L.	sour orange
<i>Citrus sinensis</i> (L.) Osbeck	orange
<i>Coffea arabica</i> L.	Arabica coffee
<i>Couma utilis</i> (Mart.) Mull. Arg.	sorva
<i>Diospyros digyna</i> Jacq.	black persimmon
<i>Eugenia ligustrina</i> (Sw.) Willd.	birchberry
<i>Eugenia luschnathiana</i> Klotzsch ex. O. Berg	pitomba
<i>Eugenia puniceifolia</i> (Kunth) DC.	
<i>Eugenia stipitata</i> McVaugh	araza
<i>Eugenia uniflora</i> L.	Brazil cherry
<i>Inga edulis</i> Mart.	ice cream bean
<i>Inga laurina</i> (Sw.) Willd.	
<i>Inga</i> sp.	
<i>Inga velutina</i> Willd.	
<i>Malpighia glabra</i> L.	Barbados cherry
<i>Mangifera indica</i> L.	mango
<i>Manihot esculenta</i> Crantz	cassava
<i>Manilkara zapota</i> (L.) P. Royen	sapodilla
<i>Myrcia popayanensis</i> Hieron.	
<i>Oenocarpus bacaba</i> Mart.	bacaba palm
<i>Parahancornia fasciculata</i> (Poir.) Benoist	amaca
<i>Passiflora edulis</i> Sims	passionfruit
<i>Passiflora</i> sp.	

Pest Information

White Striped Fruit Fly (*Bactrocera albistrigata*)

Table A-5 Host List for *Anastrepha striata* (continued)

Scientific Name	Common Name
<i>Persea americana</i> Mill.	avocado
<i>Pouteria caimito</i> (Ruiz & Pav.) Radlk.	caimito
<i>Pouteria torta</i> (Mart.) Radlk.	
<i>Pouteria viridis</i> (Pittier) Cronquist	
<i>Prunus domestica</i> L.	plum
<i>Prunus persica</i> (L.) Batsch	peach
<i>Psidium acutangulum</i> DC.	
<i>Psidium cattleianum</i> Sabine	strawberry guava
<i>Psidium cattleianum</i> Sabine var. <i>littorale</i> (Raddi) Fosberg	strawberry guava
<i>Psidium caudatum</i>	
<i>Psidium friedrichsthalianum</i> (O. Berg) Nied.	Costa Rican guava
<i>Psidium guajava</i> L.	guava
<i>Psidium guineense</i> Sw.	guinea guava
<i>Psidium laruotteanum</i> Cambess.	
<i>Psidium persicifolium</i> O.Berg.	
<i>Psidium sartorianum</i> (O. Berg) Nied.	arrayan
<i>Psidium</i> sp.	
<i>Sideroxylon obtusifolium</i> (Roem. & Schult.) T. D. Penn.	
<i>Solanum grandiflorum</i> Ruiz & Pav.	
<i>Spondias dulcis</i> Sol. ex Parkinson	jew plum
<i>Spondias mombin</i> L.	mombin
<i>Spondias purpurea</i> L.	purple mombin
<i>Syzygium malaccense</i> (L.) Merr. & L. M. Perry	Malay apple
<i>Syzygium samarangense</i> (Blume) Merr. & L. M. Perry	Java apple
<i>Terminalia catappa</i> L.	tropical almond
<i>Zuelania guidonia</i> (Sw.) Britton & Millsp.	tamay

White Striped Fruit Fly (*Bactrocera albistrigata*)

General Biology

White striped fruit flies are small (body length 6 – 7.5 mm) with predominantly black coloring, facial spots, scutum with lateral yellow stripes, and postpronotal lobe yellow in the posterior half. The scutellum often has a triangular black mark, while the wing has two brown bars across the wing and a dark apical spot.

At this time, there is no information available on the life cycle of the white striped fruit fly. In general, fruit flies lay eggs beneath the skin of host fruits

where eggs hatch, larvae feed on fruit, pupate in the soil and emerge as adults. Fruit flies living under tropical and subtropical conditions tend to have several generations each year.

Preferred Trap and Lure

Jackson trap with **Sentry® Cue-lure**, Multilure® or McPhail trap with torula yeast.



Figure A-6 White Striped Fruit Fly (*Bactrocera albistrigata*)

Distribution

White striped fruit fly occurs in Australia, Christmas Island, India, Indonesia, Malaysia, Papua New Guinea, Singapore, and Thailand. White striped fruit fly was once detected in the United States but is no longer present.

Table A-6 Host List for *Bactrocera albistrigata*

Scientific Name	Common Name
<i>Aglaia argentea</i>	tanglar
<i>Artocarpus heterophyllus</i> Lam.	jackfruit
<i>Averrhoa carambola</i> L.	carambola, country gooseberry
<i>Calophyllum inophyllum</i> L.	Alexandrian laurel, laurel
<i>Gmelina elliptica</i> Sm.	Badhara bush
<i>Guettarda speciosa</i> L.	beach gardenia
<i>Mangifera indica</i> L.	mango
<i>Mimusops elengi</i> L.	Spanish cherry
<i>Ochrosia oppositifolia</i> (Lam.) K. Schum.	kojbar

Pest Information

Carambola Fly (*Bactrocera carambolae*)

Table A-6 Host List for *Bactrocera albistrigata* (continued)

Scientific Name	Common Name
<i>Polyalthia longifolia</i> (Sonn.) Thwaites	mast tree
<i>Psidium guajava</i> L.	guava
<i>Scolopia spinosa</i>	piring
<i>Syzygium</i> spp.	water apple, watery roseapple, rose apple, clove, mountain apple, Malay apple
<i>Terminalia catappa</i> L.	tropical almond
<i>Terminalia procera</i> Roxb.	badam, white bombway

Carambola Fly (*Bactrocera carambolae*)

General Biology

Carambola fruit flies have a predominantly black or dark fuscous body, although it is sometimes a balanced mixture of black and yellow. Wings have a costal band extending below R2+3. Carambola fruit flies are morphologically indistinguishable from Oriental fruit fly. A DNA analysis is necessary to confirm identification.

At this time there is no specific information available on the life cycle of Carambola fruit fly. Related fruit flies lay eggs below the skin of host fruit, where eggs hatch within a day (can be delayed up to 20 days in cool temperatures). Larvae feed for 6-35 days, then pupate in the soil for 10-12 days (can be delayed for up to 90 days under cool temperatures). Adults occur throughout the year.

Preferred Trap and Lure

Jackson trap with Methyl eugenol or Multilure® or McPhail trap with torula yeast.



Figure A-7 Carambola Fruit Fly (*Bactrocera carambolae*)

Distribution

Carambola fruit fly occurs in Brunei, French Guiana, India (not mainland), Indonesia, Malaysia, Singapore, Suriname, Thailand, and Vietnam. It has been detected in and eradicated from Brazil and Guayana.

Table A-7 Host List for *Bactrocera carambolae*

Scientific Name	Common Name
<i>Alangium uniloculare</i> (Griff.) King	
<i>Anacardium occidentale</i> L.	cashew
<i>Annona montana</i> Macfad.	mountain soursop
<i>Annona mucosa</i> Jacq.	cherimoya
<i>Annona muricata</i> L.	soursop
<i>Arenga pinnata</i> (Wurmb) Merr.	areng palm
<i>Artocarpus altilis</i> (Parkinson) Fosberg	breadfruit
<i>Artocarpus gomezianus</i> Wall. ex Trecul	
<i>Artocarpus heterophyllus</i> Lam.	jackfruit
<i>Artocarpus integer</i> (Thunb.) Merr.	campedak
<i>Artocarpus lacucha</i> Buch.-Ham.	monkeyfruit
<i>Artocarpus odoratissimus</i> Blanco	marang
<i>Artocarpus ridigus</i> Blume. subsp. <i>asperulus</i>	
<i>Averrhoa bilimbi</i> L.	bilimbi
<i>Averrhoa carambola</i> L.	carambola
<i>Baccaurea motleyana</i> (Mull. Arg.) Mull. Arg.	rambai
<i>Bouea oppositifolia</i> (Roxb.) Meisn.	mariantree
<i>Byrsonima crassifolia</i> (L.) Kunth	craboo
<i>Canarium odontophyllum</i> Miq.	danau majang
<i>Capparis micracantha</i> DC.	
<i>Capsicum annuum</i> L.	bell pepper
<i>Capsicum chinense</i> Jacq.	bonnet pepper
<i>Chrysobalanus icaco</i> L.	coco-plum
<i>Chrysophyllum cainito</i> L.	caimito
<i>xCitrofortunella microcarpa</i> (Bunge) Wijnands	calamondin
<i>Citrus aurantiifolia</i> (Christm.) Swingle	Indian lime
<i>Citrus aurantium</i> L.	bitter orange
<i>Citrus limon</i> (L.) Burm.f.	lemon
<i>Citrus limonia</i> Osbeck	Canton lemon
<i>Citrus paradisi</i> Macfad.	grapefruit
<i>Citrus reticulata</i> Blanco	mandarin orange
<i>Citrus sinensis</i> (L.) Osbeck	orange
<i>Diospyros wallichii</i>	

Table A-7 Host List for *Bactrocera carambolae* (continued)

Scientific Name	Common Name
<i>Dryptis longifolia</i>	
<i>Eugenia stipitata</i> McVaugh	araza
<i>Eugenia uniflora</i> L.	Brazil-cherry
<i>Excoecaria agallocha</i> L.	blind-your-eye man-grove
<i>Fagraea ceilanica</i> Thunb.	hui Li
<i>Ficus grossularioides</i> Burm.f.	
<i>Ficus hispida</i> L.f.	hairy fig
<i>Fortunella japonica</i> (Thunb.) Swingle	round kumquat
<i>Fortunella margarita</i> (Lour.) Swingle	oval kumquat
<i>Fortunella polyandra</i> (Ridel.) Tanaka	Malayan kumquat
<i>Garcinia atroviridis</i> Griff. Ex T. Anderson	asam gelugor
<i>Garcinia cowa</i> Roxb. Ex DC.	cowa
<i>Garcinia dulcis</i> (Roxb.) Kurz	eggtree
<i>Garcinia griffithii</i> T. Anderson	
<i>Garcinia mangostana</i> L.	mangosteen
<i>Genipa americana</i> L.	genipa
<i>Gnetum montanum</i> Markgr.	
<i>Irvingia malayana</i> Oliv. Ex A.W.Benn	
<i>Knema angustifolia</i>	
<i>Lansium domesticum</i> Correa	lansium
<i>Lansium parasiticum</i>	
<i>Lepisanthes alata</i> (Blume) Leenh.	
<i>Malpighia emarginata</i> DC.	Barbados cherry
<i>Malpighia glabra</i> L.	acerola
<i>Mangifera indica</i> L.	mango
<i>Manilkara littoralis</i>	
<i>Manilkara zapota</i> (L.) P. Royen	sapodilla
<i>Melientha suavis</i> Pierre	
<i>Mimusops elengi</i> L.	medlar
<i>Ochanostachys amentaceae</i>	
<i>Paramignya andamanica</i>	
<i>Pellacalyx saccardianus</i>	
<i>Persea americana</i> L.	avocado
<i>Planchonella longipetiolatum</i>	
<i>Pouroma paefolia</i>	
<i>Pouteria campechiana</i> (Kunth) Baehni	eggfruit-tree
<i>Pouteria macrophylla</i> (Lam.) Eyma	lucuma

Pest Information

Guava Fruit Fly (*Bactrocera correcta*)

Table A-7 Host List for *Bactrocera carambolae* (continued)

Scientific Name	Common Name
<i>Psidium cattleyanum</i> Sabine	strawberry guava
<i>Psidium guajava</i> L.	guava
<i>Punica granatum</i> L.	pomegranate
<i>Rhodomyrtus tomentosa</i> (Aiton) Hassk.	Ceylon hill-cherry
<i>Sandoricum koetjape</i> (Burm.f.) Merr.	santol
<i>Shirakiopsis indica</i> (Willd.) Esser	
<i>Solanum lasiocarpum</i> Dunal	Indian nightshade
<i>Solanum lycopersicum</i> L. var. <i>lycopersicum</i>	tomato
<i>Spondias dulcis</i> Sol. Ex Parkinson	golden-apple
<i>Spondias mombin</i> L.	hog-plum
<i>Symplocos cochinchinensis</i> (Lour.) S. Moore	buff hazelwood
<i>Syzygium aqueum</i> (Burm.f.) Alston	watery rose-apple
<i>Syzygium grande</i> (Wight) Walp.	
<i>Syzygium jambos</i> (L.) Alston	rose-apple
<i>Syzygium malaccense</i> (L.) Merr. & L.M.Perry	Malay-apple
<i>Syzygium samarangense</i> (Blume) Merr. & L.M. Perry	Java-apple
<i>Terminalia catappa</i> L.	tropical almond
<i>Terminalia citrina</i> Roxb. ex Fleming	
<i>Terminalia procera</i> Roxb.	badam
<i>Tetractomia majus</i>	Indian cress
<i>Thevetia peruviana</i> (Pers.) K. Schum.	luckynut
<i>Triphasia trifolia</i> (Burm.f.) P. Wilson	limeberry
<i>Uvaria grandiflora</i> Roxb. Ex Hornem.	
<i>Xanthophyllum amoenum</i>	
<i>Ziziphus jujuba</i> Mill.	jujube

Guava Fruit Fly (*Bactrocera correcta*)

General Biology

Guava fruit fly adults are 5-6 mm long and are morphologically similar to *Bactrocera zonata* (peach fruit fly). Guava fruit flies are distinguishable by the color of the thorax (dark base with two bright yellow strips, yellow “shoulders” and yellow at the posterior tip), and the facial spots being united, or almost so, to form a black transverse band. A less developed whitish-cross band is present on the second abdominal segment.

Guava fruit flies lay eggs under the skin of host fruit, where eggs hatch after 3.1 days. Larvae feed on the fruit for 19 days, and the pupal stage lasts 7 days. The pre-oviposition, oviposition, and post-oviposition periods of *B. correcta* were 14.1, 13.7 and 27.2 days, respectively, at 30 +2°C and 70 percent relative humidity.

Pest Information

Guava Fruit Fly (*Bactrocera correcta*)

Preferred Trap and Lure

Jackson trap with Methyl eugenol or Multilure® or McPhail trap with torula yeast



Source: Pest and Diseases Image Library. 5311041
<http://www.bugwood.org>

Figure A-8 Guava Fruit Fly (*Bactrocera correcta*)

Distribution

Guava fruit fly occurs in Bhutan, China, India, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, and Vietnam. Guava fruit fly has been detected in the United States but is always eradicated.

Table A-8 Host List for *Bactrocera correcta*

Scientific Name	Common Name
<i>Anacardium occidentale</i> L.	cashew
<i>Areca catechu</i> L.	areca palm
<i>Artocarpus chama</i> Buch.-Ham.	chplash
<i>Artocarpus integer</i> (Thunb.) Merr.	chempedak
<i>Averrhoa carambola</i> L.	carambola
<i>Baccaurea racemosa</i> (Reinw.) Mull.Arg.	menteng
<i>Benincasa hispida</i> (Thunb.) Cogn.	ash gourd
<i>Bouea macrophylla</i> Griff.	gandaria
<i>Bouea oppositifolia</i> (Roxb.) Meisn.	mariantree
<i>Capparis sepiaria</i> L.	
<i>Capparis thorellii</i> Gagnep.	cap thorel
<i>Careya arborea</i> Roxb.	slow match tree
<i>Careya sphaerica</i> Roxb.	kra doon
<i>Carica papaya</i> L.	papaya
<i>Carissa carandas</i> L.	Bengal currant
<i>Citrus maxima</i> (Burm.) Merr.	pomelo
<i>Citrus reticulata</i> Blanco	mandarin
<i>Clausena lansium</i> (Lour.) Skeels	wampi
<i>Coccinia grandis</i> (L.) Voigt	ivy gourd
<i>Coffea canephora</i> Pierre ex A. Froehner	robusta coffee
<i>Cucumis melo</i> L.	melon
<i>Dimocarpus longan</i> Lour.	longan
<i>Dipterocarpus obtusifolius</i> Teijsm. Ex Miq.	kok sat
<i>Elaeocarpus hygrophilus</i> Kurz	Spanish plum
<i>Flacourtia indica</i> (Burm.f.) Merr.	Governor's plum
<i>Flacourtia jangomas</i> (Lour.) Raeusch	Indian plum
<i>Flueggea virosa</i> (Roxb. Ex Willd.) Royle	Chinese waterberry
<i>Garcinia dulcis</i> (Roxb.) Kurz	eggtree
<i>Garcinia xanthochymus</i> Hook. F.	sour mangosteen
<i>Heynea trijuga</i> Roxb. ex Sims	Buah pasat
<i>Irvingia malayana</i> Oliv. Ex A. W. Benn	cha bok
<i>Knema angustifolia</i>	horse blood
<i>Lepisanthes fruticosa</i> (Roxb.) Leenh.	

Pest Information

Guava Fruit Fly (*Bactrocera correcta*)

Table A-8 Host List for *Bactrocera correcta* (continued)

Scientific Name	Common Name
<i>Luffa aegyptiaca</i> Mill.	loofah
<i>Madhuca longifolia</i> (L.) J.F. Macbr.	moatree
<i>Maerua siamensis</i> (Kurz) Pax	
<i>Malpighia emarginata</i> DC	Barbados cherry
<i>Malpighia glabra</i> L.	acerola
<i>Mangifera indica</i> L.	mango
<i>Manilkara zapota</i> (L.) P.Royen	sapote
<i>Mimusops elengi</i> L.	Spanish cherry
<i>Muntingia calabura</i> L.	calabur tree
<i>Musa x paradisiaca</i> L.	banana
<i>Olax scandens</i> Roxb.	namchai khrai
<i>Opuntia monocantha</i> Haw.	drooping prickly pear
<i>Phyllanthus acidus</i> (L.) Skeels	Indian gooseberry
<i>Polyalthia longifolia</i> (Sonn.) Thwaites	cemetery tree
<i>Prunus avium</i> (L.) L.	sweet cherry
<i>Prunus cerasus</i> L.	dwarf cherry
<i>Prunus persica</i> (L.) Batsch	peach, nectarine
<i>Prunus salcinia</i> Lindl.	Asian plum
<i>Psidium guajava</i> L.	guava
<i>Sandoricum koetjape</i> (Burm.f.) Merr.	red santol
<i>Schoepfia fragrans</i> Wall.	Xiang fu mu
<i>Spondias dulcis</i> Sol. Ex Parkinson	golden apple
<i>Spondias pinnata</i> (L.f.) Kurz	hog plum
<i>Strychnos potatorum</i> L. f.	clearing nut tree
<i>Syzygium aqueum</i> (Burm. F.) Alston	water apple
<i>Syzygium borneense</i> (Miq.) Miq.	kelat
<i>Syzygium cumini</i> (L.) Skeels	java plum
<i>Syzygium jambos</i> (L.) Alston	rose apple
<i>Syzygium malaccense</i> (L.) Merr. & L.M. Perry	Malay apple
<i>Syzygium nervosum</i> DC.	Daly River satin ash
<i>Syzygium samarangense</i> (Blume) Merr. & L.M. Perry	java apple
<i>Terminalia bellirica</i> (Gaertn.) Roxb.	beach almond
<i>Terminalia catappa</i> L.	tropical almond

Table A-8 Host List for *Bactrocera correcta* (continued)

Scientific Name	Common Name
<i>Trichosanthes costata</i> Blume	ribbed orange gourd
<i>Trichosanthes cucumerina</i> L.	serpent gourd
<i>Vitis vinifera</i> L.	common grapevine
<i>Ziziphus jujuba</i> Mill.	Chinese jujube
<i>Ziziphus mauritiana</i> Lam.	Chinese apple
<i>Ziziphus nummularia</i> (Burm.f.) Wight & Arn.	jujube
<i>Ziziphus oenoplia</i> (L.) Mill.	Bidara letek

Melon Fly (*Bactrocera cucurbitae*)

Melon fruit fly (*Bactrocera cucurbitae*) (Melon fly) originated in the Indo-Malayan Region where it is the most destructive pest of cucurbits. This species has seriously restricted production of melons, cucumbers, tomatoes, and other vegetables in Hawaii following its introduction (as early as 1895). Entire fields of Hawaiian watermelons have been killed before the plants reached 20 cm in length. A loss of more than 95 percent of the pumpkins was reported in Hawaii in the early days of the infestation. India, likewise, has reported 50 percent destruction of vegetable crops.

General Biology

Melon Fruit Fly development from egg to adult under an optimum temperature of 81°F and 70 percent relative humidity takes approximately 12 days. Under optimum conditions, the period of time for completion of one generation is about 21 days. Females live 3 to 5 months. The shortest length of time for one generation is about 12 days, but it is usually about 1 to 2 months.

A mated female Melon Fruit Fly may deposit an average of 15 eggs per day for a month or more. The eggs take 6 to 28 hours to hatch. The larvae go through three instars in 4 to 17 days. They drop to the ground and pupate 2 to 5 cm under the soil surface. The pupal stage usually lasts 7 to 13 days, but may last up to 59 days in cold weather.

Melon Fruit Fly adults are 6 to 8 mm long or slightly longer than a housefly. They are reddish yellow, with brown spots along veins of the wings. Females have a slender sharp-pointed ovipositor.

Pest Information

Melon Fly (*Bactrocera cucurbitae*)

Preferred Trap and Lure

Jackson trap with **Sentry® Cue-lure** or Multilure® or McPhail trap with torula yeast



Source: Scott Bauer, USDA Agricultural Research Service. 1317036
<http://www.bugwood.org>

Figure A-9 Melon Fruit Fly (*Bactrocera cucurbitae*)

Distribution

The Melon fly is native to Asia. It occurs in Africa, Burma, Sri Lanka, China, French Polynesia (Tahiti, Moorea, and Bora Bora), Guam, Hawaii, India, Indonesia, Malaya, New Guinea, Okinawa, Philippine Islands, Rota, Thailand, Southeastern Asia, and Taiwan.

Table A-9 Host List for *Bactrocera cucurbitae*

Scientific Name	Common Name
<i>Abelmoschus esculentus</i> (L.) Moench	okra
<i>Annona muricata</i> L.	soursop
<i>Annona reticulata</i> L.	custard apple
<i>Benincasa hispida</i> (Thunb.) Cogn.	Chinese melon
<i>Brassica juncea</i> (L.) Czern.	leaf mustard
<i>Brassica oleracea</i> L. var <i>botrytis</i> L.	cauliflower
<i>Capsicum annuum</i> L.	pepper, chili
<i>Capsicum frutescens</i> L.	pepper, tabasco
<i>Carica papaya</i> L.	papaya
<i>Cayratia trifolia</i> (L.) Domin	grape
<i>Citrullus colocynthis</i> (L.) Schrad.	colocynth
<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai	watermelon
<i>Citrullus</i> spp.	melon
<i>Citrus nobilis</i> Lour.	king orange
<i>Citrus paradisi</i> Macfad.	grapefruit
<i>Citrus sinensis</i> (L.) Osbeck	sweet orange
<i>Coccinia grandis</i> (L.) Voigt	ivy gourd
<i>Coccinia</i> spp.	gourd
<i>Crescentia</i> spp.	gourd
<i>Cucumis anguria</i> L.	West India gherkin,
<i>Cucumis melo</i> L.	cantaloupe
<i>Cucumis melo</i> L. subsp <i>melo</i>	melon
<i>Cucumis melo</i> L. subsp <i>melo</i> var <i>cantalupo</i> Ser.	cantaloupe
<i>Cucumis melo</i> L. subsp <i>agrestis</i> (Naudin) Pangalo var <i>conomon</i> (Thunb.) Makino	Oriental pickling melon
<i>Cucumis sativus</i> L.	cucumber
<i>Cucurbita maxima</i> Duchesne	squash
<i>Cucurbita moschata</i> Duchesne	Canada pumpkin
<i>Cucurbita pepo</i> L.	pumpkin
<i>Ficus carica</i> L.	fig
<i>Lablab purpureus</i> (L.) Sweet subsp <i>purpureus</i>	hyacinth bean
<i>Lagenaria siceraria</i> (Molina) Standl.	white flowered gourd
<i>Lagenaria</i> spp.	gourd
<i>Luffa acutangula</i> (L.) Roxb.	angled luffa gourd

Pest InformationMelon Fly (*Bactrocera cucurbitae*)**Table A-9 Host List for *Bactrocera cucurbitae* (continued)**

Scientific Name	Common Name
<i>Luffa aegyptiaca</i> Mill.	sponge gourd
<i>Luffa</i> spp.	gourd
<i>Malus sylvestris</i> (L.) Mill.	apple
<i>Mangifera indica</i> L.	mango
<i>Momordica balsamina</i> L.	balsam apple gourd
<i>Momordica dioica</i> Roxb. Ex Willd.	kakari gourd
<i>Momordica</i> spp.	gourd
<i>Passiflora edulis</i> Sims	passionflower, passionfruit, yellow lilikoi
<i>Passiflora laurifolia</i> L.	water lemon
<i>Persea americana</i> Mill.	avocado
<i>Phaseolus lunatus</i> L.	lima bean
<i>Phaseolus vulgaris</i> L.	mung bean
<i>Phoenix dactylifera</i> L.	date palm
<i>Prunus persica</i> (L.) Batsch	peach
<i>Psidium cattleyanum</i> Sabine	cattley strawberry guava, guava
<i>Psidium guajava</i> L.	guava
<i>Pyrus communis</i> L.	pear
<i>Sechium edule</i> (Jacq.) Sw.	chayote
<i>Sesbania grandiflora</i> (L.) Pers.	scarlet wisteria tree
<i>Sicyes</i> spp.	bur cucumber
<i>Solanum betaceum</i> Cav.	tree tomato
<i>Solanum lycopersicum</i> L. var <i>lycopersicum</i>	tomato
<i>Solanum melongena</i> L.	eggplant
<i>Trichosanthes cucumerina</i> L. var <i>anguina</i> (L.) Haines	serpent cucumber gourd,
<i>Trichosanthes ovigera</i> Blume	snake gourd
<i>Trichosanthes</i> spp.	gourd
<i>Vigna unguiculata</i> (L.) Walp.	cowpea

Oriental Fruit Fly (*Bactrocera dorsalis*)

Oriental fruit fly (*Bactrocera dorsalis* complex; *Bactrocera papayae*, *Bactrocera philippinensis*, *Bactrocera invadens*, and others) (OFF), one of the world's most destructive pests of soft fruits, was introduced into the Hawaiian Islands about 1945, and by 1948 had increased to high population numbers. Under Hawaiian conditions this species is more aggressive than the Melon fruit fly or the Mediterranean fruit fly. It is likely that, under favorable conditions, OFF could survive and reach damaging numbers in areas of California, Texas, and Florida.

Although most literature does not indicate OFF to be as destructive to citrus as Medfly, a report from Sri Lanka noted that unprotected grapefruit had been heavily attacked; this species has also been cited as a serious citrus pest in Taiwan. In Hawaii, OFF is destructive to all marketable fruit crops except pineapple and strawberries.

Pakistan recorded a 50-70 percent OFF infestation of peaches and pears in one area. In a second area 50-80 percent of loquat, apricot, guava, and fig crops were attacked in succession from April to October, while peach, pear, and persimmon were attacked to the same extent from mid-August to October. These are examples of the destructive importance of this pest to a variety of fruits.

General Biology

Egg to adult development of OFF at an optimum temperature of 80°F and a relative humidity of 70 percent takes approximately 22 days. The adult usually becomes sexually mature 8 to 12 days after emergence. The minimum period of time for one generation is approximately 30 days.

A mated female OFF may oviposit as many as 136 eggs per day, usually about 10 per oviposition site. Eggs may take only 24 hours to hatch, but at cooler temperatures can require up to 20 days. The larval stage may last from 6 to 35 days depending on the temperature. At optimum temperatures the larval stage can be as short as 6 to 7 days. Third instar larvae can exit fruit by a flipping motion before or after the fruit drops to the ground. They then pupate 2-5 cm (rarely up to 13 cm) below the soil surface. Soil conditions may compel the larvae to move up to 90 cm away from fallen fruit in search of a suitable pupation site. The pupal stage usually takes 10 to 12 days to complete. This can be extended to 120 days by extremely cool temperatures.

OFF usually overwinters in this stage. Newly emerged females normally require about 8-12 days to mature before they can begin to oviposit. Adults usually live for about 1 to 3 months but have survived a year in cool mountain localities. The species has been able to survive frosts and slight snowfall.

Pest Information

Oriental Fruit Fly (*Bactrocera dorsalis*)

When hosts are available, the flies tend to remain in one area. However, dispersive movement, when prompted by lack of host fruits, warm weather following cool or cold temperatures, or by newly emerged adults before reaching maturity, can be greater than 3 miles. When forced, such as flying over water, movement can be as much as 40 miles. There are normally two daily peaks of activity, one in early morning for feeding and one at dusk for mating, which is at a maximum about 15 minutes prior to sunset.

OFF adults are somewhat larger than a housefly, about 8.0 mm long, color bright, variable, mostly yellow with two black markings on the thorax and abdomen. Females have slender sharp-pointed ovipositors. Wings are clear, with a narrow dark band along the forward margin and a short diagonal band near the base.

Preferred Trap and Lure

Jackson trap with Methyl eugenol with Multilure® or McPhail trap with torula yeast



Source: Florida Division of Plant Industry Archive
Florida Department of Agriculture and Consumer Services. 5193078
<http://www.bugwood.org>

Figure A-10 Oriental Fruit Fly (*Bactrocera dorsalis*)



Source: Pest and Diseases Image Library. 5311069
<http://www.bugwood.org>

Figure A-11 Oriental Fruit Fly (*Bactrocera dorsalis*)

Pest InformationOriental Fruit Fly (*Bactrocera dorsalis*)**Distribution**

OFF is native to Asia. Its presence has currently been verified in Burma, China, Taiwan, India, Sri Lanka, Indonesia (Java, Sumatra, Timor), Thailand, and the United States (Hawaiian Islands). Prior infestations in the United States (California), the Mariana Islands, and Japan (the Ryukyu Islands) were eradicated.

Table A-10 Host List for *Bactrocera dorsalis* Complex

Scientific Name	Common Name
<i>Acca sellowiana</i> (O. Berg) Burret	pineapple-guava
<i>Adenantha pavonina</i> L.	red sandalwood
<i>Adonidia merrillii</i> (Becc.) Becc.	manila palm
<i>Aegle marmelos</i> (L.) Correa	baeltree
<i>Azelia xylocarpa</i> (Kurz) Craib	Doussie
<i>Alangium chinense</i> (Lour.) Harms	begonialleaf alangium
<i>Alangium griffithii</i> (C. B. Clarke) Harms	
<i>Alangium salviifolium</i> (L.f.) Wangerin	sage-leaf alangium
<i>Alpinia mutica</i> Roxb.	small shell ginger
<i>Anacardium occidentale</i> L.	cashew nut
<i>Ananas comosus</i> (L.) Merr.	pineapple
<i>Annona xatemoya</i> Mabb.	atemoya
<i>Annona cherimola</i> Mill.	cherimoya
<i>Annona glabra</i> L.	pond-apple
<i>Annona macrophyllata</i> Donn. Sm.	llama
<i>Annona montana</i> Macfad.	mountain soursop
<i>Annona muricata</i> L.	soursop
<i>Annona reticulata</i> L.	custard apple
<i>Annona senegalensis</i> Pers.	wild custard-apple
<i>Annona squamosa</i> L.	custard apple, sugar apple
<i>Antiaris toxicaria</i> (Pers.) Lesch.	sackingtree
<i>Antidesma ghaesembilla</i> Gaertn.	black currant tree
<i>Aporosa villosa</i> (Lindl.) Baill.	ye-mein
<i>Ardisia crenata</i> Sims	hen's eye, coralberry
<i>Areca catechu</i> L.	areca palm
<i>Arenga engleri</i> Becc.	formosan sugar palm
<i>Arenga pinnata</i> (Wurmb.) Merr.	sugar palm
<i>Arenga westerhoutii</i> Griff.	
<i>Artabotrys siamensis</i> Miq.	
<i>Artocarpus altilis</i> (Parkinson) Fosberg	breadfruit
<i>Artocarpus chama</i> Buch.-Ham.	chplash
<i>Artocarpus elastica</i> Reinw. ex Blume	terap
<i>Artocarpus heterophyllus</i> Lam.	jackfruit

Table A-10 Host List for *Bactrocera dorsalis* Complex (continued)

Scientific Name	Common Name
<i>Artocarpus integer</i> (Thunb.) Merr.	chempedak
<i>Artocarpus lacucha</i> Buch.-Ham.	monkeyfruit
<i>Artocarpus lanceifolius</i> Roxb.	keledang
<i>Artocarpus lanceolatus</i> Trecul	
<i>Artocarpus odoratissimus</i> Blanco	marang
<i>Artocarpus rigidus</i> subsp. <i>asperulus</i> (Gagnep.) F. M. Jarrett	monkey-jack
<i>Artocarpus sericarpus</i> F.M. Jarrett	
<i>Averrhoa bilimbi</i> L.	bilimbi
<i>Averrhoa carambola</i> L.	carambola
<i>Azadirachta excelsa</i> (Jack) M. Jacobs	
<i>Baccaurea angulata</i> Merr.	red angled tampoi
<i>Baccaurea motleyana</i> (Mull. Arg.) Mull. Arg.	rambai
<i>Baccaurea racemosa</i> (Reinw.) Mull. Arg.	menteng
<i>Baccaurea ramiflora</i> Lour.	Burmese grape
<i>Bactris gasipaes</i> Kunth	peach palm
<i>Balakata baccata</i> (Roxb.) Esser	jiang guo wu jiu
<i>Barringtonia edulis</i> Seem.	cutnut
<i>Bischofia javanica</i> Blume	java-cedar, needlebark
<i>Blighia sapida</i> K.D. Koenig	akee
<i>Borassus flabellifer</i> L.	toddy palm
<i>Bouea macrophylla</i> Griff.	gandaria
<i>Bouea oppositifolia</i> (Roxb.) Meisn.	plum mango
<i>Breynia reclinata</i> (Roxb.) Hook. F.	
<i>Bridelia stipularis</i> (L.) Blume	lulalub
<i>Brugmansia xcaudata</i> Pers.	angel's-trumpet
<i>Callicarpa longifolia</i> Lam.	chukin
<i>Calophyllum inophyllum</i> L.	Alexandrian laurel, kamani
<i>Cananga odorata</i> (Lam.) Hook. F. & Thomson	ylang-ylang
<i>Canarium insulare</i>	
<i>Capparis sepiaria</i> L.	hedge caper bush
<i>Capparis tomentosa</i> Lam.	African caper
<i>Capsicum annuum</i> L.	bell pepper
<i>Capsicum chinense</i> Jacq.	bonnet pepper
<i>Capsicum frutescens</i> L.	tabasco pepper
<i>Capsicum frutescens</i> var. <i>grossum</i>	sweet pepper
<i>Capsicum pubescens</i> Ruiz & Pav.	apple chile
<i>Careya arborea</i> Roxb.	
<i>Careya sphaerica</i> Roxb.	kra doon

Pest Information

Oriental Fruit Fly (*Bactrocera dorsalis*)

Table A-10 Host List for *Bactrocera dorsalis* Complex (continued)

Scientific Name	Common Name
<i>Carica papaya</i> L.	papaya
<i>Carissa carandas</i> L.	carandas-plum
<i>Carissa macrocarpa</i> (Eckl.) A. DC.	natal plum
<i>Carissa spinarum</i> L.	currentbush
<i>Caryota mitis</i> Lour.	Burmese fishtail palm
<i>Casimiroa edulis</i> La Llave & Lex.	white sapote
<i>Celtis tetrandra</i> Roxb.	si rui po
<i>Cereus aethiops</i> Haw.	cactus
<i>Cestrum latifolium</i> Lam.	jasmin sauvage
<i>Cestrum nocturnum</i> L.	lady-of-the-night
<i>Chionanthus parkinsonii</i> (Hutch.) Bennet & Raizada	
<i>Chrysobalanus icaco</i> L.	coco plum
<i>Chrysophyllum albidum</i> G. Don	white star apple
<i>Chrysophyllum cainito</i> L.	caimito, star apple
<i>Chrysophyllum olivoforme</i> L.	caimitillo
<i>Chrysophyllum roxburghii</i> G. Don	athapala
<i>Chukrasia tabularis</i> A. Juss.	Burmese almondwood
<i>Cinnamomum yabunikkei</i> H. Ohba	yabu-nikkei
<i>Cissus repens</i> Lam.	
x <i>Citrofortunella floridana</i> J.W. Ingram & H.E. Moore	limequat
x <i>Citrofortunella microcarpa</i> (Bunge) Wijnands	calamandarin
<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai	watermelon
<i>Citrullus colocynthis</i> (L.) Schrad.	bitter apple
<i>Citrus aurantiifolia</i> (Christm. Swingle)	sour lime
<i>Citrus aurantium</i> L.	sour orange
<i>Citrus clementina</i> Hort. ex Tanaka	clementine
<i>Citrus deliciosa</i> Ten.	Italian tangerine
<i>Citrus depressa</i> Hayata	
<i>Citrus hystrix</i> DC.	kaffir lime
<i>Citrus jambhiri</i> Lush.	rough lemon
<i>Citrus keraji</i> Hort. ex Tanaka	kabuchi
<i>Citrus latifolia</i> (Yu. Tanaka) Tanaka	Persian lime
<i>Citrus limetta</i> Risso	sweet lime
<i>Citrus limon</i> (L.) Burm. F.	lemon
<i>Citrus limonia</i> Osbeck	rangpur lime
<i>Citrus maxima</i> (Burm.) Merrill	pummelo
<i>Citrus natsudaikai</i> Hayata	Japanese summer grapefruit
<i>Citrus nobilis</i> Lour.	king orange
<i>Citrus oto</i> Hort. ex Yu. Tanaka	

Table A-10 Host List for *Bactrocera dorsalis* Complex (continued)

Scientific Name	Common Name
<i>Citrus paradisi</i> Macfady	grapefruit
<i>Citrus reticulata</i> Blanco	mandarin orange
<i>Citrus sinensis</i> (L.) Osbeck	sweet orange
<i>Citrus x tangelo</i> J.W. Ingram & H.E. Moore	tangelo
<i>Citrus unshiu</i> Marcow.	Satsuma orange
<i>Clausena lansium</i> (Lour.) Skeels	wampi
<i>Clusia rosea</i> Jacq.	copey
<i>Coccinia grandis</i> (L.) Voigt	ivy gourd
<i>Coccoloba uvifera</i> (L.) L.	sea grape
<i>Cocos nucifera</i> L.	coconut
<i>Coffea arabica</i> L.	Arabian coffee
<i>Coffea canephora</i> Pierre ex A. Froehner	robusta coffee
<i>Cordia dentata</i> Poir.	English clammy berry
<i>Cordyla pinnata</i> (A. Rich.) Milne-Redh.	
<i>Crinum asiaticum</i> L.	Asiatic poisonbulb
<i>Cucumis ficifolius</i> A. Rich.	cucumis
<i>Cucumis melo</i> L.	cantaloupe
<i>Cucumis melo</i> var. <i>cantalupo</i> Ser.	cantaloupe
<i>Cucumis melo</i> var. <i>conomon</i> (Tthunb.) Makino	oriental pickling melon
<i>Cucumis sativus</i> L.	cucumber
<i>Cucurbita maxima</i> Duchesne	squash
<i>Cucurbita pepo</i> L.	pumpkin
<i>Cydonia oblonga</i> Mill.	quince
<i>Datura stramonium</i> L.	common thorn-apple
<i>Desmos chinensis</i> Lour.	jia ying zhua
<i>Dillenia obovata</i> (Blume) Hoogland	simpoh padang
<i>Dimocarpus longan</i> Lour.	longan
<i>Diospyros areolata</i> King & Gamble	
<i>Diospyros blancoi</i> A. DC.	velvet apple
<i>Diospyros castanea</i> (Craib). H.R. Fletcher	
<i>Diospyros diepenhorstii</i> Miq.	kaya malam
<i>Diospyros glandulosa</i> Lace	mai kua thoun
<i>Diospyros japonica</i> Siebold & Zucc.	ryukyu-mamegaki
<i>Diospyros kaki</i> Thunb.	Japanese persimmon
<i>Diospyros malabarica</i> (Desr.) Kostel.	Indian persimmon
<i>Diospyros maritima</i> Blume	sea ebony
<i>Diospyros mollis</i> Griff.	ma kluea
<i>Diospyros montana</i> Roxb.	mountain persimmon
<i>Diospyros sandwicensis</i> (A. DC.) Fosberg	elama

Pest Information

 Oriental Fruit Fly (*Bactrocera dorsalis*)

Table A-10 Host List for *Bactrocera dorsalis* Complex (continued)

Scientific Name	Common Name
<i>Diospyros vera</i> (Lour.) A. Chev.	native persimmon
<i>Diplocyclos palmatus</i> (L.) C. Jeffrey	striped-cucumber
<i>Dovyalis hebecarpa</i> (Gardner) Warb.	Ceylon gooseberry
<i>Dracaena draco</i> (L.) L.	dragon tree
<i>Dracaena steudneri</i> Schweinf. ex Engl.	northern large leaf dragon tree
<i>Ehretia microphylla</i> Lam.	Philippine tea
<i>Elaeocarpus hygrophilus</i> Kurz	ma-kok-nam
<i>Elaeocarpus serratus</i> L.	Ceylon olive
<i>Eriobotrya japonica</i> (Thunb) Lindl..	loquat
<i>Erycibe subspicata</i> Wall. ex G. Don	zhui xu dingg gong teng
<i>Eugenia brasiliensis</i> Lam.	Brazil cherry
<i>Eugenia megacarpa</i> Craib	
<i>Eugenia palumbis</i> Merr.	
<i>Eugenia uniflora</i> L.	Surinam cherry
<i>Exalobus monopetalus</i>	
<i>Excoecaria agallocha</i> L.	blind-your-eye mangrove
<i>Fagraea ceilanica</i> Thunb.	hui li
<i>Fibraurea tinctoria</i> Lour.	sekunyit
<i>Ficus auriculata</i> Lour.	roxburgh fig
<i>Ficus benjamina</i> L.	Benjamin fig
<i>Ficus carica</i> L.	common fig
<i>Ficus chartacea</i> (Wall. ex Kurz) Wall. ex King	zhi ye rong
<i>Ficus concatian</i>	
<i>Ficus eligodon</i>	
<i>Ficus erecta</i> Thunb.	ai xiao tian xian guo
<i>Ficus fistulosa</i> Reinw. ex Blume	yellow stem fig
<i>Ficus hirta</i> Vahl	cu ye rong
<i>Ficus hispida</i> L. f.	hairy fig
<i>Ficus microcarpa</i> L. f.	Chinese banyan
<i>Ficus obpyramidiata</i>	
<i>Ficus ottoniifolia</i> Miq.	
<i>Ficus pumila</i> L.	creeping mission fig
<i>Ficus racemosa</i> L.	cluster fig
<i>Ficus religiosa</i> L.	sacred fig
<i>Ficus septica</i> Burm. F.	septic fig
<i>Ficus virgata</i> Reinw. ex Blume	dao rong
<i>Flacourtia indica</i> (Burman f.) Merrill	Governor's plum
<i>Flacourtia rukam</i> Zoll. & Moritzi	Prunier café
<i>Flueggea virosa</i> (Roxb. ex Willd) Royle	common bushweed

Table A-10 Host List for *Bactrocera dorsalis* Complex (continued)

Scientific Name	Common Name
<i>Fortunella japonica</i> (Thunb.) Swingle	calamondin orange
<i>Fortunella margarita</i> (Lour.) Swingle	nagami kumquat
<i>Fortunella polyandra</i> (Ridl.) Tanaka	Malayan kumquat
<i>Fragaea berteriana</i> Benth var. <i>sair</i> Gilg. & Benedict	pua keniken
<i>Fragaria xananassa</i> Duchesne ex Rozier	strawberry
<i>Fragaria chiloensis</i> (L.) Mill.	strawberry
<i>Garcinia atroviridis</i> Griff. ex T. Anderson	gelugor
<i>Garcinia celebica</i> (Burm.) L.	gourka
<i>Garcinia cowa</i> Roxb. ex DC.	cowa
<i>Garcinia dulcis</i> (Roxb.) Kurz	eggtree
<i>Garcinia griffithii</i> T. Anderson	
<i>Garcinia hombroniana</i> Pierre	
<i>Garcinia intermedia</i> (Pittier) Hammel	
<i>Garcinia mangostana</i> L.	mangosteen
<i>Garcinia mannii</i> Oliv.	kar
<i>Garcinia parvifolia</i> Miq.	kandis
<i>Garcinia prainiana</i> King	button mangosteen
<i>Garcinia speciosa</i> Wall.	ma pong
<i>Garcinia subelliptica</i> Merr.	
<i>Garcinia xanthochymus</i> Hook. F.	gourka
<i>Garuga floribunda</i> Decne.	garuga
<i>Glochidion littorale</i> Blume	saka saka
<i>Glycosmis pentaphylla</i> (Retz.) DC.	shan xiao ju
<i>Gmelina elliptica</i> Sm.	badhara bush
<i>Gmelina philippensis</i> Cham.	
<i>Gossypium barbadense</i> L.	Egyptian cotton
<i>Gymnopetalum scabrum</i> (Lour.) W.J. de Wilde & Duyfjes	feng gua
<i>Gynochthodes umbellata</i> (L.) Razafim. & B. Bremer	common Indian mulberry
<i>Hanguana malayana</i> (Jack) Merr.	
<i>Heynea trijuga</i> Roxb. ex Sims	
<i>Holigarna kurzii</i> King	
<i>Horsfieldia subglobosa</i> Warb.	penarahan
<i>Hylocereus undatus</i> (Haw.) Britton & Rose	dragon fruit
<i>Inocarpus fagiferus</i> (Parkinson) Fosberg	Tahitian chestnut
<i>Irvingia gabonensis</i> (Aubre-Lecomte ex O'Rorke) Baill.	dikanut
<i>Irvingia malayana</i> Oliv. ex A.W. Benn.	kabok
<i>Ixora javanica</i> (Blume) DC.	
<i>Ixora macrothyrsa</i> (Teijsm. & Binn.) R. Br.	santan-pula
<i>Jubaea chilensis</i> (Molina) Baill.	syrup palm

Pest Information

Oriental Fruit Fly (*Bactrocera dorsalis*)

Table A-10 Host List for *Bactrocera dorsalis* Complex (continued)

Scientific Name	Common Name
<i>Juglans hindsii</i> (Jeps.) R. E. Sm.	California walnut
<i>Juglans nigra</i> L.	black walnut
<i>Juglans regia</i> L.	English walnut
<i>Kedrostis leloja</i> (Forssk.) C. Jeffrey	
<i>Knema globularia</i> (Lam.) Warb.	xiao ye hong guang shu
<i>Lagenaria siceraria</i> (Molina) Standl.	bottle gourd
<i>Lansium domesticum</i> Correa	langsats
<i>Lansium parasiticum</i> (Osbeck) K.C. Sahni & Bennet	
<i>Lepisanthes alata</i> (Blume) Leenh.	sinpaju
<i>Lepisanthes fruticosa</i> (Roxb.) Leenh.	
<i>Lepisanthes rubiginosa</i> (Roxb.) Leenh.	kelatiayu
<i>Lepisanthes tetraphylla</i> (Vahl) Radlk.	
<i>Lindera oxyphylla</i> Hk. F.	
<i>Litchi chinensis</i> Sonn.	litchi
<i>Litsea glutinosa</i> (Lour.) C. B. Rob.	bolly-beech
<i>Litsea salicifolia</i> (J. Roxb. ex Nees) Hook. f.	hei mu jiang zi
<i>Luffa acutangula</i> (L.) Roxb.	ribbed loofah
<i>Luffa aegyptiaca</i> Mill.	loofah
<i>Lycianthes biflora</i> (Lour.) Bitter	hong si xian
<i>Machilus thunbergii</i> Siebold & Zucc.	tabu
<i>Maclura cochinchinensis</i> (Lour.) Corner	cockspurthorn
<i>Maerua duchesnei</i> (De Wild.) F. White	
<i>Malpighia emarginata</i> DC.	Barbados cherry
<i>Malpighia glabra</i> L.	acerola
<i>Malus domestica</i> Borkh.	apple
<i>Malus sylvestris</i> (L.) Mill.	crab apple
<i>Mammea americana</i> L.	mammy apple
<i>Mammea siamensis</i> T. Anderson	
<i>Mangifera caesia</i> Jack	wani
<i>Mangifera caloneura</i> Kurz	mamauangpa
<i>Mangifera foetida</i> Lour.	bachang mango
<i>Mangifera griffithii</i> Hook. F.	rawa
<i>Mangifera indica</i> L.	mango
<i>Mangifera laurina</i> Blume	boa pow
<i>Mangifera longipetiolata</i> King	asam damaran
<i>Mangifera odorata</i> Griff.	kuine
<i>Mangifera pajang</i> Kosterm.	bambangan
<i>Manilkara jaimiqui</i> (C. Wright) Dubard subsp. <i>emarginata</i> (L.) Cronquist	wild sapodilla
<i>Manilkara zapota</i> (L.) P. Royen	sapote

Table A-10 Host List for *Bactrocera dorsalis* Complex (continued)

Scientific Name	Common Name
<i>Merremia vitifolia</i> (Burm. F.) Hallier f.	zhang ye yu huang cao
<i>Microcos tomentosa</i> Sm.	
<i>Mimusops elengi</i> L.	Spanish cherry
<i>Mitrephora maingayi</i> Hook f. Thomson	thabut-net
<i>Momordica balsamina</i> L.	balsam apple
<i>Momordica charantia</i> L.	bitter melon
<i>Momordica cochinchinensis</i> (Lour.) Spreng	balsam apple
<i>Morella rubra</i> Lour.	Chinese-arbutus
<i>Morinda citrifolia</i> L.	Indian mulberry
<i>Morinda coreia</i> Buch.-Ham.	
<i>Morus alba</i> L.	white mulberry
<i>Morus nigra</i> L.	black mulberry
<i>Muntingia calabura</i> L.	Jamaica cherry
<i>Murraya exotica</i> L.	Chinese-boxwood
<i>Murraya paniculata</i> (L.) Jack	mock orange
<i>Musa acuminata</i> Colla	Chinese banana
<i>Musa balbisiana</i> Colla	plantain
<i>Musa xparadisica</i> L.	banana
<i>Musa troglodytarum</i> L.	fe'l banana
<i>Myxopyrum smilacifolium</i> Blume	
<i>Nauclea orientalis</i> (L.) L.	canary wood
<i>Neolamarckia cadamba</i> (Roxb.) Bosser	burflower tree
<i>Neolitsea sericea</i> (Blume) Koidz.	shirodamo
<i>Nephelium cuspidatum</i> Blue var. <i>eripetalum</i> (Miq.) Leenh.	panungaian
<i>Nephelium lappaceum</i> L.	rambutan
<i>Nestegis sandwicensis</i> (A. Gray) O. Deg., I. Deg. & L.A.S. Johnson	olopua
<i>Nicandra physalodes</i> (L.) Gaertn.	apple-of-Peru
<i>Nicotiana glauca</i> Graham	tree tobacco
<i>Nicotiana tabacum</i> L.	tobacco
<i>Ochreinauclea maingayi</i> (Hook. f.) Ridsdale	
<i>Ochrosia mariannensis</i> A. DC.	
<i>Olax scandens</i> Roxb.	dheniani
<i>Olea europaea</i> L.	olive
<i>Opuntia ficus-indica</i> (L.) Mill.	prickly pear cactus
<i>Palaquium maingayi</i> (C.B. Clarke) King & Gamble	nyatoh
<i>Pandanus fragrans</i> Gaudich.	screw pine
<i>Pandanus odorifer</i> (Forssk.) Kuntze	hala
<i>Papilionanthe hookeriana</i> (Rchb. F.) Schltr. X <i>Papilionanthe teres</i> (Roxb.) Schltr.	

Pest Information

Oriental Fruit Fly (*Bactrocera dorsalis*)

Table A-10 Host List for *Bactrocera dorsalis* Complex (continued)

Scientific Name	Common Name
<i>Parinari anamense</i> Hance	
<i>Parkia speciosa</i> Hassk.	petai
<i>Passiflora edulis</i>	purple granadilla
<i>Passiflora foetida</i> L.	stinking passion fruit
<i>Passiflora incarnata</i> L.	wild passion fruit
<i>Passiflora laurifolia</i> L.	yellow granadilla
<i>Passiflora ligularis</i> Juss.	sweet granadilla
<i>Passiflora quadrangularis</i> L.	giant granadilla
<i>Passiflora tripartita</i> (Juss.) Poir. var. <i>mollissima</i> (Kunth) Holm-Niels. & P. Jorg	banana passion fruit
<i>Pereskia grandiflora</i> Pfeiff.	
<i>Persea americana</i> Miller	avocado
<i>Phaseolus vulgaris</i> L.	green bean
<i>Phoenix dactylifera</i> L.	date palm
<i>Phyllanthus acidus</i> (L.) Skeels	gooseberry tree
<i>Physalis angulata</i> L.	angular winter cherry
<i>Physalis minima</i> L.	green gooseberry
<i>Physalis peruviana</i> L.	ground cherry
<i>Physalis philadelphica</i> Lam.	husk tomato
<i>Physalis pubescens</i> L.	strawberry tomato
<i>Pimenta dioica</i> (L.) merrill	allspice
<i>Planchonella duclitan</i> (Blanco) Bakh. F.	
<i>Polyalthia longifolia</i> (Sonn.) Thwaites	cemetery tree
<i>Polyalthia simiarum</i> (Buch.-Ham. Ex Hook. F. & Thomson) Benth. Ex Hook. F. & Thomson	
<i>Pometia pinnata</i> J.R. Forst. & G. Forst	Fijian longan
<i>Poncirus trifoliata</i> (L.) Raf.	Japanese bitter orange
<i>Pouteria caimito</i> (Ruiz & Pav.) Radlk.	abiu
<i>Pouteria campechiana</i> (Kunth) Baehni	canistel
<i>Pouteria sapota</i> (Jacq.) H.E. Moore & Stearn	mamaey sapote
<i>Pouteria viridis</i> (Pittier) Cronquist	green sapote
<i>Premna serratifolia</i> L.	coastal premna
<i>Prunus americana</i> Marshall	American plum
<i>Prunus armeniaca</i> L.	apricot
<i>Prunus avium</i> (L.) L.	sweet cherry
<i>Prunus campanulata</i> Maxim.	Taiwan cherry
<i>Prunus cerasifera</i> Ehrh.	cherry plum
<i>Prunus cerasoides</i> D. Don	sour cherry
<i>Prunus cerasus</i> L.	maraschino cherry
<i>Prunus domestica</i> L.	common plum

Table A-10 Host List for *Bactrocera dorsalis* Complex (continued)

Scientific Name	Common Name
<i>Prunus ilicifolia</i> (Nutt. Ex Hook. & Arn.) D. Dietr.	Catalina cherry
<i>Prunus lusitanica</i> L.	Portugese cherry
<i>Prunus mume</i> Siebold & Zucc.	Japanese apricot
<i>Prunus persica</i> (L.) Batsch.	peach
<i>Prunus persica</i> (L.) Batsch. var. <i>nucipersica</i> (Suckow) C.K. Schneid	nectarine
<i>Prunus salicina</i> Lindl.	Japanese plum
<i>Psidium cattleyanum</i> Sabine	strawberry guava
<i>Psidium cattleyanum</i> var. <i>littorale</i> (Raddi) Fosberg	red strawberry guava
<i>Psidium guajava</i> L.	guava
<i>Punica granatum</i> L.	pomegranate
<i>Pyrus communis</i> L.	pear
<i>Pyrus pashia</i> Buch.-Ham. ex D. Don	
<i>Pyrus pyrifolia</i> (Burm. F.) Nakai	sand pear
<i>Rhodomyrtus tomentosa</i> (Aiton) Hassk.	downy rose myrtle
<i>Rollinia mucosa</i> (Jacq.) Baill.	
<i>Saba senegalensis</i> (A. DC.) Pichon	liane saba
<i>Sambucus javanica</i> Reinw. ex Blume	Chinese elder
<i>Sandoricum koetjape</i> (Burm. f.) Merrill	santol
<i>Santalum album</i> L.	white sandalwood
<i>Santalum paniculatum</i> Hook. & Arn.	sandalwood
<i>Sarcocephalus latifolius</i> (Sm.) Bruce	country fig
<i>Sauropus androgynus</i> (L.) Merr.	star gooseberry
<i>Schoepfia fragrans</i> Wall.	
<i>Sclerocarya birrea</i> (A. Rich.) Hochst.	maroola plum
<i>Sechium edule</i> (Jacq.) Sw.	chayote
<i>Sesbania grandiflora</i> (L.) Poir.	scarlet wisteria tree
<i>Shirakiopsis indica</i> (Willd.) Esser	
<i>Simarouba glauca</i> DC.	paradise tree
<i>Siphonodon celastrineus</i> Griff.	
<i>Solanum aculeatissimum</i> Jacq.	Dutch eggplant
<i>Solanum aethiopicum</i> L.	kumba
<i>Solanum anguivi</i> Lam.	African eggplant
<i>Solanum betaceum</i> Cav.	tree tomato
<i>Solanum donianum</i> Walp.	mullein
<i>Solanum erianthum</i> D. Don	big eggplant
<i>Solanum grandiflorum</i> Ruiz & Pav.	
<i>Solanum granulosoleprosum</i> Dunal	
<i>Solanum incanum</i> L.	bitter apple
<i>Solanum lasiocarpum</i> Dunal	Indian nightshade

Pest Information

Oriental Fruit Fly (*Bactrocera dorsalis*)

Table A-10 Host List for *Bactrocera dorsalis* Complex (continued)

Scientific Name	Common Name
<i>Solanum linnaeanum</i> Hepper & P.-M. L. Jaeger	apple-of-sodom
<i>Solanum lycopersicum</i> L.	tomato
<i>Solanum macrocarpon</i> L.	gboma eggplant
<i>Solanum mammosum</i> L.	macawbush
<i>Solanum mauritianum</i> Scop.	bugtree
<i>Solanum melongena</i> L.	eggplant
<i>Solanum muricatum</i> Aiton	melon pear
<i>Solanum nigrescens</i> M. Martens & Galeotti	divine nightshade
<i>Solanum nigrum</i> L.	black nightshade
<i>Solanum pimpinellifolium</i> L.	currant tomato
<i>Solanum pseudocapsicum</i> L.	Jerusalem cherry
<i>Solanum quitoense</i> Lam.	Quito orange
<i>Solanum scabrum</i> Mill.	garden huckleberry
<i>Solanum seaforthianum</i> Andrews	black nightshade
<i>Solanum sessiliflorum</i> Dunal	cocona
<i>Solanum stramonifolium</i> Jacq.	
<i>Solanum torvum</i> Sw.	Devil's fig
<i>Solanum trilobatum</i> L.	
<i>Solanum tuberosum</i> L.	Irish potato
<i>Sorindeia madagascariensis</i> DC.	sondriry
<i>Spondias dulcis</i> Sol. ex Parkinson	Otaheite apple
<i>Spondias mombin</i> L.	Jamaica plum
<i>Spondias pinnata</i> L.	common hog plum
<i>Spondias purpurea</i> L.	purple mombin
<i>Spondias tuberosa</i> Arruda ex Kost.	imbu
<i>Streblus asper</i> Lour.	
<i>Strychnos mellodora</i> S. Moore	
<i>Syzygium aqueum</i> (Burm. F.) Alston	watery rose apple
<i>Syzygium borneense</i> (Miq.) Miq.	
<i>Syzygium cumini</i> (L.) Skeels	malay apple
<i>Syzygium formosanum</i> (Hayata) Mori.	
<i>Syzygium grande</i> (Wight) Walp.	
<i>Syzygium jambos</i> (L.) Alston	rose apple
<i>Syzygium lineatum</i> (DC.) Merr. & L.M. Perry	
<i>Syzygium malaccense</i> (L.) Merrill & L.M. Perry	mountain apple
<i>Syzygium nervosum</i> DC.	satin-ash
<i>Syzygium samarangense</i> (Blume) Merr. & L.M. Perry	Java apple
<i>Taddalia asiatica</i>	
<i>Terminalia catappa</i> L.	tropical almond

Table A-10 Host List for *Bactrocera dorsalis* Complex (continued)

Scientific Name	Common Name
<i>Terminalia chebula</i> Retz.	black myrobalan
<i>Terminalia citrina</i> (Gaertn.) Roxb. ex Fleming	black chuglam
<i>Theobroma cacao</i> L.	cocoa
<i>Thevetia peruviana</i> (pers.) K. Schum.	yellow oleander
<i>Trichosanthes boninensis</i> Nakai	
<i>Trichosanthes cucumerina</i> L.	serpent gourd
<i>Trichosanthes dioica</i> Roxb.	pointed gourd
<i>Trichosanthes ovigera</i> Blume	snake gourd
<i>Triphasia trifolia</i> (Burm. F.) P. Wilson	limeberry
<i>Turpinia ternata</i> Nakai	san ye shan xiang yuan
<i>Uvaria grandiflora</i> Roxb. ex Hornem.	
<i>Uvaria macrophylla</i> Roxb.	
<i>Vaccinium reticulatum</i> Sm.	ohelo
<i>Viburnum japonicum</i> (Thunb.) Spreng.	hakusan-boku
<i>Vitellaria paradoxa</i> C.F. Gaertn.	shea-butter tree
<i>Vitis</i> spp.	grape
<i>Vitis vinifera</i> L.	grape
<i>Wikstroemia phillyreifolia</i>	
<i>Willughbeia cochiinchinensis</i> Pierre ex Pit.	
<i>Xanthophyllum flavescens</i> Roxb.	
<i>Ximenia americana</i> L.	yellow plum
<i>Zehneria mucronata</i> (Blume) Miq.	
<i>Zehneria wallichii</i> (C.B. Clarke) C. Jeffrey	
<i>Ziziphus jujuba</i> Mill.	jujube
<i>Ziziphus mauritiana</i> Lam.	Chinese date
<i>Ziziphus nummularia</i> (Burm. F.) Wight & Arn.	
<i>Ziziphus oenopila</i> (L.) Mill.	

Solanum Fruit Fly (*Bactrocera latifrons*)

General Biology

Solanum fruit flies are about the size of a house fly. Solanum fruit flies have a rust brown abdomen, bright yellow stripes at the base of the wings, and a single black spot at the tip of each wing. Legs are predominantly yellow with some brown markings.

Pest Information

Solanum Fruit Fly (*Bactrocera latifrons*)

Under laboratory conditions, eggs are laid beneath the skin of host fruit, and eggs hatch within a few days (mean 2.3). Larvae feed for a mean of 8.5 days, pupation occurs in soil, and the pupal stage lasts a mean 10.2 days. Adults occur year round.

Preferred Trap and Lure

Multilure® or McPhail trap with torula yeast



Source: Scott Bauer, USDA-ARS. 1323086
<http://www.bugwood.org>

Figure A-12 Malaysian Fruit Fly (*Bactrocera latifrons*)

Distribution

Solanum fruit fly occurs in Brunei, China, Hong Kong, India, Indonesia, Japan, Kenya, Laos, Malaysia, Pakistan, Singapore, Sri Lanka, Taiwan Island, Tanzania, Thailand, and Vietnam. In the United States it has been eradicated from the contiguous States, but occurs in the Hawaiian Islands.

Table A-11 Host List for *Bactrocera latifrons*

Scientific Name	Common Name
<i>Baccaurea motleyana</i> (Mull. Arg.) Mull. Arg.	rambai
<i>Benincasa hispida</i> (Thunb.) Cogn.	ash gourd
<i>Capsicum annuum</i> L.	chili pepper
<i>Capsicum annuum</i> L. var <i>annuum</i>	bell pepper
<i>Capsicum chinense</i> Jacq.	bonnet pepper
<i>Capsicum frutescens</i> L.	bird pepper
<i>Capsicum</i> spp.	pepper
<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai	watermelon
<i>Citrus aurantiifolia</i> (Christm.) Swingle	lime
<i>Coccinia grandis</i> (L.) Voigt	ivy gourd
<i>Coffea arabica</i> L.	Arabian coffee
<i>Cucumis dipsaceus</i> Ehrenb. Ex Spach	hedgheg cucumber
<i>Cucumis melo</i> L. subsp <i>agrestis</i> (Naudin) Pangalo var <i>conomon</i> (Thunb.) Makino	Oriental pickling melon
<i>Cucumis sativus</i> L.	cucumber
<i>Dimocarpus longan</i> Lour. Subsp. <i>longan</i>	longan
<i>Diplocyclos palmatus</i> (L.) C. Jeffrey	lollipop-climber
<i>Gmelina philippensis</i> Cham.	
<i>Lablab purpureus</i> (L.) Sweet subsp. <i>purpureus</i>	lab-lab bean
<i>Lagenaria siceraria</i> (Molina) Standl.	bottle gourd
<i>Lagerstroemia indica</i> L.	crape myrtle
<i>Linociera parkinsoni</i>	
<i>Linociera xanthocarpum</i>	
<i>Litchi chinensis</i> Sonn.	lychee
<i>Lycianthes biflora</i> (Lour.) Bitter	da chi hong si xian
<i>Mangifera altissima</i> Blanco	paho
<i>Mangifera indica</i> L.	mango
<i>Momordica trifoliolata</i> Hook.f.	
<i>Murraya paniculata</i> (L.) Jack	Chinese boxwood
<i>Passiflora foetida</i> L.	wild passionfruit
<i>Passiflora</i> spp.	granadilla
<i>Physalis peruviana</i> L.	cape-gooseberry
<i>Psidium guajava</i> L.	guava
<i>Punica granatum</i> L.	pomegranate
<i>Sapindus rarak</i> DC.	
<i>Solanum aculeatissimum</i> Jacq.	Dutch eggplant
<i>Solanum aethiopicum</i> L.	Chinese scarlet eggplant
<i>Solanum americanum</i> Mill.	American nightshade
<i>Solanum anguivi</i> Lam.	

Table A-11 Host List for *Bactrocera latifrons* (continued)

Scientific Name	Common Name
<i>Solanum donianum</i> Walp.	
<i>Solanum dulcamaroides</i> Poir.	
<i>Solanum erianthum</i> D. Don	big eggplant
<i>Solanum granuloseprosum</i> Dunal	
<i>Solanum incanum</i> L.	
<i>Solanum lasiocarpum</i> Dunal	Indian nightshade
<i>Solanum linnaeanum</i> Hepper & P.-M.L. Jaeger	apple-of-Sodom
<i>Solanum lycopersicum</i> L. var. <i>cerasiforme</i> (Alef.) Fosberg	cherry tomato
<i>Solanum lycopersicum</i> L. var. <i>lycopersicum</i>	tomato
<i>Solanum macrocarpon</i> L.	African eggplant
<i>Solanum mammosum</i> L.	macawbush
<i>Solanum melongena</i> L.	eggplant
<i>Solanum nigrescens</i> M. Martens & Galeotti	divine nightshade
<i>Solanum nigrum</i> L.	black nightshade
<i>Solanum pimpinellifolium</i> L.	currant tomato
<i>Solanum pseudocapsicum</i> L.	Jerusalem-cherry
<i>Solanum scabrum</i> Mill.	garden huckleberry
<i>Solanum</i> spp.	
<i>Solanum</i> subsect. <i>Lycopersicon</i> spp.	
<i>Solanum sisymbriifolium</i> Lam.	sticky nightshade
<i>Solanum stramonifolium</i> Jacq.	
<i>Solanum torvum</i> Sw.	devil's fig
<i>Solanum trilobatum</i> L.	purple-fruited pea eggplant
<i>Solanum viarum</i> Dunal	tropical soda apple
<i>Solanum violaceum</i> Ortega	ci tian qie
<i>Terminalia catappa</i> L.	Indian almond
<i>Ziziphus jujuba</i> Mill.	common jujube
<i>Ziziphus nummularia</i> (Burm.f.) Wight & Arn.	

Queensland Fruit Fly (*Bactrocera tryoni*)

Queensland fruit fly (*Bactrocera tryoni*) (QFF), a serious pest of pome (apple, pear, etc.) and stone (peach, apricot, etc.) fruits, may be destructive to some citrus varieties during peak population years. An outbreak in New South Wales during 1940-41 caused rejection of 5-25 percent of the citrus at harvest. The fly appears to be as destructive to fruit production in Australia as the Oriental fruit fly is in the countries of its range. Commercial stone fruit orchards have been abandoned in Queensland due to this pest.

General Biology

The pre-ovipositional period for QFF averages two weeks. Up to seven eggs are laid in a group in fruit punctures. As many as 40 larvae have been found in one peach. Under favorable conditions, eggs hatch in 2 to 3 days. Larvae are full grown in 5 to 7 days. Pupae remain in the soil from a week in warm periods to a month or more in cooler periods. The total life cycle requires about 2 to 3 weeks in summer to 2 months in autumn. Because adult females can live for prolonged periods, four or five overlapping generations can develop annually. Overwintering is in the adult stage.

The adult female of QFF is 6 mm long, has a wing expanse of 10 to 12 mm, and transparent wings. Body coloration is brown marked with yellow. The dorsum of the thorax has a broad creamy band with a narrow yellow stripe on either side. The abdomen is constricted at the base, and broadly rounded at the tip.

Preferred Trap and Lure

Jackson trap with Sentry® Cue-lure or Multilure® or McPhail trap with torula yeast



Source: G.T. O'Loughlin, Department of Agriculture. 1949063
<http://www.bugwood.org>

Figure A-13 Queensland Fruit Fly (*Bactrocera tryoni*)

Distribution

Distribution of QFF in Australia is in the States of New South Wales, Queensland, South Australia, and Victoria.

Table A-12 Host List for *Bactrocera tryoni*

Scientific Name	Common Name
<i>Acca sellowiana</i> (O. Berg) Burret	pineapple guava
<i>Actinidia deliciosa</i> (A. Chev.) C.F. Liang & A.R. Ferguson	kiwifruit
<i>Anacardium occidentale</i> L.	cashew
<i>Annona cherimola</i> Mill.	cherimoya
<i>Annona muricata</i> L.	soursop
<i>Annona reticulata</i> L.	bullock's heart
<i>Annona</i> sp.	
<i>Annona squamosa</i> L.	custard apple
<i>Artocarpus altilis</i> (Parkinson) Fosberg	breadfruit
<i>Artocarpus heterophyllus</i> Lam.	jackfruit
<i>Asimina triloba</i> (L.) Dunal	pawpaw
<i>Averrhoa carambola</i> L.	carambola
<i>Barringtonia asiatica</i> (L.) Kurz	fish killer tree
<i>Barringtonia edulis</i>	
<i>Callophyllum inophyllum</i> L.	Alexandrian laurel
<i>Cananga odorata</i> (Lam.) Hook. f. & Thomson	ylang ylang tree
<i>Canarium vulgare</i> Leenh.	Chinese olive
<i>Capsicum annuum</i> L.	sweet pepper
<i>Carica papaya</i> L.	papaya
<i>Casimiroa edulis</i> LaLlave & Lex.	white sapote
<i>Chrysophyllum cainito</i> L.	star apple
<i>Citrus aurantiifolia</i> (Christm.) Swingle	Egyptian lime
<i>Citrus latifolia</i> (Yu. Tanaka) Tanaka	Persian lime
<i>Citrus limon</i> (L.) Burm. F.	lemon
<i>Citrus maxima</i> (Burm.) Merr.	pomelo
<i>Citrus medica</i> L.	citron
<i>Citrus paradisi</i> Macfad.	grapefruit
<i>Citrus reticulata</i> Blanco	mandarin
<i>Citrus sinensis</i> (L.) Osbeck	orange
<i>Citrus xtangelo</i> J.W. Ingram & H.E. Moore	tangelo
<i>Coffea</i> sp.	coffee
<i>Cucurbita pepo</i> L.	acorn squash
<i>Cydonia oblonga</i> Mill.	quince
<i>Dimocarpus longan</i> Lour.	longan

Table A-12 Host List for *Bactrocera tryoni* (continued)

Scientific Name	Common Name
<i>Diospyros bicolor</i>	
<i>Diospyros digyna</i> Jacq.	black sapote
<i>Diospyros kaki</i> Thunb.	Japanese persimmon
<i>Diospyros mespiliformis</i> Hochst. Ex A. DC.	
<i>Diospyros</i> sp.	persimmon
<i>Durio zibethinus</i> L.	Durian
<i>Eriobotrya japonica</i> (Thunb. Lindl.	Loquat
<i>Eugenia brasiliensis</i> Lam	Brazil cherry
<i>Eugenia uniflora</i> L.	Surinam cherry
<i>Ficus carica</i> L.	common fig
<i>Ficus pancheriana</i>	
<i>Ficus</i> sp.	
<i>Fortunella japonica</i> (Thunb.) Swingle	round kumquat
<i>Fragaria xananassa</i> Duchesne ex Rozier	garden strawberry
<i>Fragaria vesca</i> L.	European strawberry
<i>Garcinia mangostana</i> L.	mangosteen
<i>Hernandia cordigera</i>	
<i>Hylocereus undatus</i> (Haw.) Britton & Rose	dragon fruit
<i>Inocarpus fagiferus</i> (Parkinson) Fosberg	Tahiti chestnut
<i>Litchi chinensis</i> Sonn.	litchi
<i>Malpighia glabra</i> L.	acerola
<i>Malus domestica</i> Borkh.	apple
<i>Mangifera indica</i> L.	mango
<i>Manilkara zapota</i> (L.) P. Royen	sapodilla
<i>Mimusops elengi</i> L.	medlar
<i>Morinda citrifolia</i> L.	canary wood
<i>Morus alba</i> L.	Russian mulberry
<i>Musa xparadisica</i> L.	banana
<i>Musa</i> sp.	
<i>Musa troglodytarum</i> L.	fe'i banana
<i>Nephelium lappaceum</i> L.	rambutan
<i>Opuntia ficus-indica</i> (L.) Mill.	mission prickly pear
<i>Passiflora edulis</i> Sims	passionfruit
<i>Passiflora laurifolia</i> L.	yellow granadilla
<i>Passiflora quadrangularis</i> L.	giant granadilla
<i>Persea americana</i> Mill.	avocado
<i>Phoenix dactylifera</i> L.	date

Table A-12 Host List for *Bactrocera tryoni* (continued)

Scientific Name	Common Name
<i>Phyllanthus acidus</i> (L.) Skeels	gooseberry tree
<i>Physalis peruviana</i> L.	cape gooseberry
<i>Planchonella sphaerocarpa</i>	
<i>Plinia cauliflora</i> (Mart.) Kausel	Brazilian grapetree
<i>Pometia pinnata</i> J.R. Forst. & G. Forst.	Pacific lychee
<i>Pouteria caimito</i> (Ruiz & Pav.) Radlk.	caimito
<i>Prunus americana</i> Marshall	American plum
<i>Prunus armeniaca</i> L.	Apricot
<i>Prunus avium</i> (L.) L.	sweet cherry
<i>Prunus domestica</i> L.	European plum
<i>Prunus persica</i> (L.) Batsch	peach
<i>Prunus persica</i> (L.) Batsch var. <i>nucipersica</i> (Suckow) C.K. Schneid.	nectarine
<i>Prunus simonii</i> Carriere	apricot plum
<i>Psidium acutangulum</i> DC.	
<i>Psidium cattleyanum</i> Sabine	cattley guava
<i>Psidium cattleyanum</i> Sabine var. <i>littorale</i> (Raddi) Fosberg	strawberry guava
<i>Psidium friedrichsthalianum</i> (O. Berg) Nied.	Costa Rican guava
<i>Psidium guajava</i> L.	guava
<i>Punica granatum</i> L.	pomegranate
<i>Pyriluma sphaerocarpum</i> (Baill.) Aubrev	
<i>Pyrus communis</i> L.	pear
<i>Pyrus pyrifolia</i> (Burm. F.) Nakai var. <i>culta</i> (Makino) Nakai	Asian pear
<i>Rubus fruticosus</i> auct. Aggr.	European blackberry
<i>Rubus idaeus</i> L.	raspberry
<i>Rubus loganobaccus</i> L.H. Bailey	loganberry
<i>Sandoricum koetjape</i> (Burm.f.) Merr.	santol
<i>Solanum betaceum</i> Cav.	tree tomato
<i>Solanum lycopersicum</i> L. var. <i>lycopersicum</i>	tomato
<i>Solanum mauritianum</i> Scop.	bugtree
<i>Solanum melongena</i> L.	eggplant
<i>Solanum muricatum</i> Aiton	pepino
<i>Spondias dulcis</i> Sol. Ex Parkinson	Jew plum
<i>Spondias mombin</i> L.	hog plum
<i>Synsepalum dulcificum</i> (Schumach.) Daniell	miracle fruit
<i>Syzygium cumini</i> (L.) Skeels	jambolan
<i>Syzygium jambos</i> (L.) Alston	rose apple
<i>Syzygium malaccense</i> (L.) Merr. & L.M. Perry	Malay apple
<i>Syzygium samarangense</i> (Blume) Merr. & L.M. Perry	Java apple

Table A-12 Host List for *Bactrocera tryoni* (continued)

Scientific Name	Common Name
<i>Terminalia catappa</i> L.	tropical almond
<i>Thevetia peruviana</i> (Pers.) K. Schum.	luckynut
<i>Vaccinium corymbosum</i> L.	blueberry
<i>Vasconcellea xheilbornii</i> (V.M. Badillo) V.M. Badillo	babaco
<i>Vitis vinifera</i> L.	European grape
<i>Ximenia americana</i> L.	false sandalwood
<i>Ziziphus jujuba</i> Mill.	Chinese jujube
<i>Ziziphus mauritiana</i> Lam.	Chinese apple

Peach Fruit Fly (*Bactrocera zonata*)

The peach fruit fly (*Bactrocera zonata*) (PFF), a native of Asia, occurs in Southeast Asia, Egypt, India, Mauritius, Moluccas Islands, Pakistan, Reunion Island, Sri Lanka, and Thailand. Introductions into California have been eradicated.

General Biology

PFF development from egg to adult, at optimum temperatures of 80°F and a relative humidity of 70 percent, 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.

The PFF is a strong flier and can be active any time of the year when temperatures exceed 50°F. In India and Pakistan the fly attacks jujube in early spring, changing to loquat and peach by May-June, then to cucurbits, mango, bael, citrus, guava, pomegranate, and sapodilla for the rest of the year. The pre-oviposition period is 10 to 23 days. The female oviposits batches of two to nine eggs beneath the skin of the host fruit. An individual may produce more than 1000 eggs during her lifetime. These hatch in 2-3 days. Larvae feed on the fruit for 1 to 3 weeks, and then emerge to pupate 2-15 cm in the ground. The pupal period varies from 4 days in summer to over 6 weeks in winter. Published observations indicate that PFF can survive winters in temperate climates.

Adults of the PFF have been observed to mate in dim light in the laboratory and during twilight in the field. Males and females may mate several times. The female may lay fertile eggs 2 to 7 days after mating and throughout her life span. The pre-oviposition period is 10-23 days.

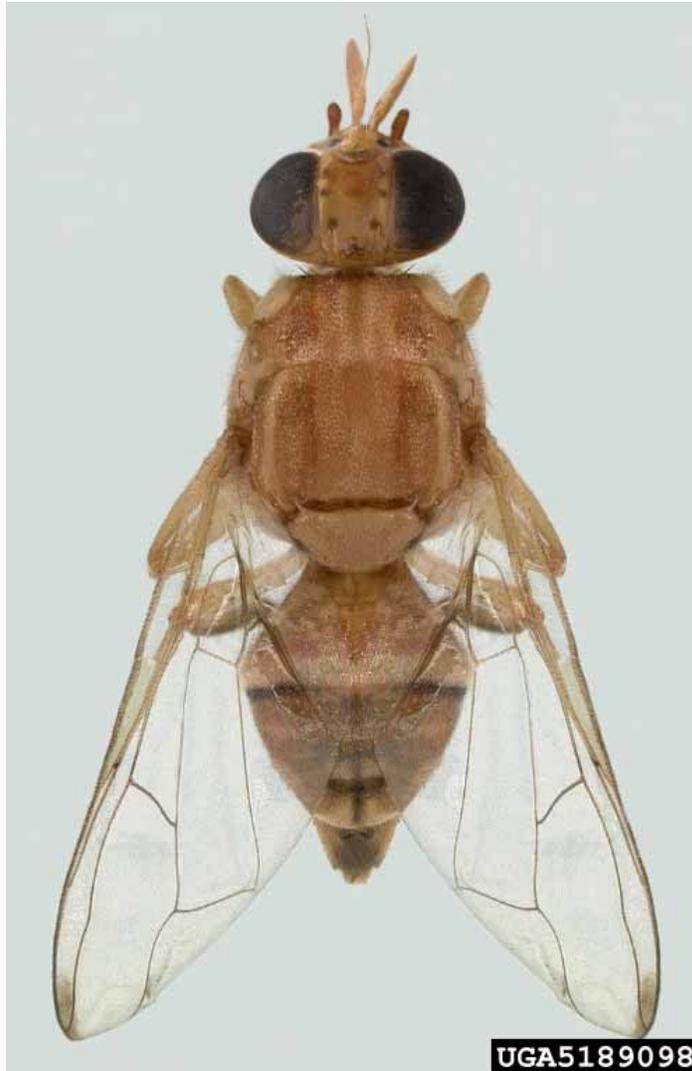
Pest Information

Peach Fruit Fly (*Bactrocera zonata*)

The adult PFF 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.

Preferred Trap and Lure

Jackson trap with methyl eugenol, Multilure® or McPhail trap with torula yeast



Source: Natasha Wright, Florida Department of Agriculture and Consumer Services. 5189098
<http://www.bugwood.org>

Figure A-14 Peach Fruit Fly (*Bactrocera zonata*)

Distribution

Peach fruit fly occurs in Algeria, Bangladesh, Bhutan, Brazil, Egypt, Gaza Strip, India, Indonesia, Iran, Laos, Lebanon, Libya, Mauritius, Myanmar, Nepal, Oman, Pakistan, Philippines, Saudi Arabia, Sri Lanka, Syria, Taiwan Island, Thailand, United Arab Emirates, Vietnam, and Yemen. It has been detected in and eradicated from Israel and the United States.

Table A-13 Host List for *Bactrocera zonata*

Scientific	Common
<i>Abelmoschus esculentus</i> (L.) Moench	okra
<i>Acca sellowiana</i> (O. Berg) Burret	pineapple guava
<i>Aegle marmelos</i> (L.) Correa	indian bael
<i>Azelia xylocarpa</i> (Kurz) Craib	makamong
<i>Annona cherimola</i> Mill.	cherimoya
<i>Annona muricata</i> L.	soursop
<i>Annona reticulata</i> L.	custard apple
<i>Annona squamosa</i> L.	custard apple
<i>Careya arborea</i> Roxb.	kumbhi
<i>Carica papaya</i> L.	papaya
<i>Citrofortunella japonica</i>	calamondin orange
<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai	watermelon
<i>Citrus aurantiifolia</i> (Christm.) Swingle	lime
<i>Citrus aurantium</i> L.	sour orange
<i>Citrus limon</i> (L.) Burm. F.	lemon
<i>Citrus maxima</i> (Burm.) Merr.	pummelo or shaddock
<i>Citrus medica</i> L.	citron
<i>Citrus nobilis</i> Lour.	king orange
<i>Citrus paradisi</i> Macfad.	grapefruit
<i>Citrus reticulata</i> Blanco	mandarin orange, tangerine
<i>Citrus sinensis</i> (L.) Osbeck	sweet orange
<i>Coccinia grandis</i> (L.) Voigt	little gourd
<i>Coccinia</i> spp.	gourd
<i>Crescentia</i> spp.	gourd
<i>Cucumis melo</i> L.	cantaloupe
<i>Cucumis melo</i> L. subsp <i>agrestis</i> (Naudin) Pangalo var <i>conomon</i> (Thunb.) Makino	long melon
<i>Cucumis melo</i> L. subsp <i>melo</i> var <i>cantalupo</i> Ser	cantaloupe
<i>Cucumis sativus</i> L.	cucumber
<i>Cucurbita</i> sp.	gourd
<i>Cydonia oblonga</i> Mill.	quince
<i>Diospyros</i> sp.	persimmon

Pest Information

Peach Fruit Fly (*Bactrocera zonata*)

Table A-13 Host List for *Bactrocera zonata* (continued)

Scientific	Common
<i>Elaeocarpus grandiflorus</i> Sm.	lily of the valley tree
<i>Elaeocarpus madopetalus</i>	ma-kok-nam
<i>Elaeocarpus sphaericus</i> (Gaertn.) K. Schum.	blue marbletree, New Guinea quandong
<i>Eriobotrya japonica</i> (Thunb.) Lindl.	loquat
<i>Eugenia brasiliensis</i> Lam.	Brazil cherry
<i>Eugenia uniflora</i> L.	Surinam cherry
<i>Ficus benghalensis</i> L.	Banyan fig
<i>Ficus carica</i> L.	fig
<i>Ficus macrophylla</i> Pers.	Moreton Bay fig
<i>Ficus retusa</i> L.	glossy leaf fig
<i>Ficus rubiginosa</i> Desf. Ex Vent.	Port Jackson fig
<i>Ficus</i> spp.	fig
<i>Fortunella japonica</i> (Thunb.) Swingle	Chinese orange, kumquat
<i>Grewia asiatica</i> L.	phalsa
<i>Lagenaria</i> spp.	gourd
<i>Luffa acutangula</i> (L.) Roxb.	ribbed or ridged gourd
<i>Luffa aegyptiaca</i> Mill.	smooth luffa gourd, sponge
<i>Luffa</i> spp.	gourd
<i>Luffa vulgaris</i>	gourd
<i>Madhuca longifolia</i> (L.) J.F. Macbr. Var latifolia (Roxb.) A. Chev.	mahua, mowra-buttertree
<i>Malpighia emarginata</i> DC.	Barbados cherry
<i>Malpighia glabra</i> L.	Barbados cherry
<i>Malus domestica</i> Borkh.	apple
<i>Malus pumila</i> Mill.	paradise apple
<i>Malus sylvestris</i> (L.) Mill.	apple
<i>Mammea americana</i> L.	mammy apple
<i>Mangifera foetida</i> Lour.	bachang mango
<i>Mangifera indica</i> L.	mango
<i>Mangifera odorata</i> Griff.	kuine
<i>Manilkara hexandra</i> (Roxb.) Dubard	balata sapodilla
<i>Manilkara jaimiqui</i> (C. Wright) Dubard subsp emarginata (L.) Cronquist	wild sapodilla
<i>Manilkara zapota</i> (L.) P. Royen	chiku sapodilla
<i>Mimusops elengi</i> L.	Spanish cherry
<i>Momordica balsamina</i> L.	hawthorn balsam apple
<i>Momordica charantia</i> L.	balsam pear, bitter melon
<i>Momordica cochinchinensis</i> (Lour.) Spreng.	balsam apple, gac
<i>Momordica</i> spp.	gourd
<i>Ochrosia elliptica</i> Labill.	bourbon orange

Table A-13 Host List for *Bactrocera zonata* (continued)

Scientific	Common
<i>Olea europaea</i> L.	olive
<i>Persea americana</i> Mill.	avocado
<i>Phoenix dactylifera</i> L.	date palm
<i>Planchonia careya</i> (F. Muell.) R. Knuth	patana oak, kumbhi
<i>Prunus americana</i> Marshall	American plum,
<i>Prunus armeniaca</i> L.	apricot
<i>Prunus avium</i> (L.) L.	sweet cherry
<i>Prunus cerasus</i> L.	sour cherry
<i>Prunus domestica</i> L.	European plum
<i>Prunus dulcis</i> (Mill.) D.A. Webb ¹	almond with husk
<i>Prunus ilicifolia</i> (Nutt.ex Hook. & Arn.) D. Dietr.	Catalina cherry
<i>Prunus lusitanica</i> L.	Portugese cherry
<i>Prunus persica</i> (L.) Batsch	peach
<i>Prunus persica</i> (L.) Batsch var <i>nucipersica</i> (Suckow) C.K. Schneid.	nectarine
<i>Prunus salicina</i> Lindl.	Japanese plum
<i>Prunus salicina</i> x <i>Prunus cerasifera</i>	Methley plum
<i>Psidium cattleianum</i> Sabine	strawberry guava
<i>Psidium cattleianum</i> Sabine var <i>cattleianum</i> forma <i>lucidum</i> O. Deg.	yellow strawberry guava
<i>Psidium cattleianum</i> Sabine var <i>littorale</i> (Raddi) Fosberg	red strawberry guava
<i>Psidium guajava</i> L.	guava
<i>Punica granatum</i> L.	pomegranate
<i>Putranjiva roxburghii</i> Wall.	wild olive
<i>Pyrus communis</i> L.	pear
<i>Pyrus pashia</i> Buch.-Ham. Ex D. Don	kaeuth
<i>Pyrus pyrifolia</i> (Burm.f.) Nakai	Asian pear
<i>Pyrus ussuriensis</i> Maxim.	Harbin Pear
<i>Solanum aculeatissimum</i> Jacq.	nightshade
<i>Solanum donianum</i> Walp.	mullein nightshade
<i>Solanum lycopersicum</i> L. var <i>lycopersicum</i>	tomato
<i>Solanum mauritianum</i> Scop.	wild tobacco
<i>Solanum melongena</i> L.	eggplant
<i>Solanum muricatum</i> Aiton	pepino
<i>Solanum pseudocapsicum</i> L.	Jerusalem cherry
<i>Solanum seaforthianum</i> Andrews	Brazilian nightshade,
<i>Syzygium aqueum</i> (Burm.f.) Alston	water apple, watery roseapple
<i>Syzygium cumini</i> (L.) Skeels	Java plum, jambolana

Table A-13 Host List for *Bactrocera zonata* (continued)

Scientific	Common
<i>Syzygium jambos</i> (L.) Alston	rose apple
<i>Syzygium malaccense</i> (L.) Merr. & L.M. Perry	mountain apple, Malay apple
<i>Syzygium samarangense</i> (Blume) Merr. & L.M. Perry	Java apple
<i>Terminalia bellirica</i> (Gaertn.) Roxb.	belleric myrobalan,
<i>Terminalia catappa</i> L.	tropical almond
<i>Terminalia chebula</i> Retz.	black or chebulic myrobalan
<i>Trichosanthes</i> spp.	gourd
<i>Ziziphus hysudrica</i>	
<i>Ziziphus mauritiana</i> Lam	Chinese date, jujube
<i>Ziziphus</i> sp.	

1 Harvested almonds with dried husks are not regulated articles for peach fruit fly.

Mediterranean Fruit Fly (*Ceratitis capitata*)

The Mediterranean fruit fly (*Ceratitis capitata*) (Medfly) is a widespread and destructive pest of citrus and numerous vegetables and other fruits. Some Mediterranean areas have experienced up to 100 percent infestation in stone fruits. Greece in 1928 experienced a 50 percent loss in citrus fruit production. Medfly has been eradicated from the United States many times. States with environments conducive to Medfly establishment are Alabama, Arizona, California, Florida, Georgia, Louisiana, Mississippi, South Carolina, and Texas. If Medfly becomes established in the United States agricultural losses are expected to be in the hundreds of millions of dollars. The losses in export revenues due to trade embargoes would be enormous and would comprise 40 percent of the total annual losses due to the pest.

General Biology

The 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. Consequently, several hundred eggs have been found in a single cavity. Under normal conditions, a female may lay over 300 eggs during her lifetime. Females will not lay eggs when temperatures drop below 62°F.

Medfly eggs hatch in 2 to 3 days at a 79°F optimum temperature. Larvae feed throughout the fruit pulp for 6 to 10 days at this temperature. Generally, the fruit falls to the ground during or after larval development. Third instar larvae

normally emerge from the fruit and pupate in the soil. However, it is not necessary for them to enter the soil to pupate.

Medfly adults emerge from pupal cases in 6 to 15 days at 79°F. The newly emerged female adults, not being sexually mature, must feed on proteinaceous substances in order to reach sexual maturity. The pre-oviposition period is extremely variable depending on environmental conditions, the minimum time being 2 days. Feeding will continue during oviposition. The period of time for one generation under favorable conditions is 21 to 33 days.

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

Adult Medfly are slightly smaller than a housefly. The head of the female is whitish gray with a dark band on the rostrum. Antennae are three-jointed, the first and second joints brown and third joint grayish yellow. Eyes are wine-red with a greenish sheen in live specimens. The thorax is lustrous black with yellow and white patches and lines, shoulders having characteristic white rings, wings have broad interrupted transverse bands with a zone through the middle rib extending from anterior to posterior, and another zone extending toward the posterior half along the rear transverse rib. The flat and curved female abdomen terminating in a short ovipositor is yellowish with three, lead-gray, transverse bands on the dorsal side in the front and middle segments.

Pest Information

Mediterranean Fruit Fly (*Ceratitis capitata*)

Preferred Trap and Lure

Jackson trap with Trimedlure, Multilure® (3 component) or McPhail trap with torula yeast



Source: Scott Bauer, USDA-ARS. 1317085
<http://www.bugwood.org>

Figure A-15 Mediterranean Fruit Fly (*Ceratitis capitata*)

Distribution

Native to Africa, the Medfly has spread to all countries bordering the Mediterranean Sea (the Mediterranean littoral), Australia, Central America, South America, Europe, Hawaii, and various islands in the Pacific. Medfly occurs in Afghanistan, Albania, Algeria, Angola, Argentina, Armenia, Australia, Azerbaijan, Benin, Bolivia, Brazil, Bulgaria, Burkina Faso, Burundi, Cameroon, Cape Verde, Colombia, Comoros, Congo, Costa Rica, Cote d'Ivoire, Croatia, Curacao, Cyprus, Denmark, Ecuador, Egypt, El Salvador, Ethiopia, Finland, France, Gabon, Gambia, Gaza Strip, Georgia, Ghana, Greece, Guatemala, Guinea, Honduras, Iran, Iraq, Israel, Italy, Jordan, Kenya, Lebanon, Liberia, Libya, Madagascar, Malawi, Mali, Malta, Mauritius, Mexico, Montenegro, Morocco, Mozambique, Namibia, Nicaragua, Niger, Nigeria, Northern Mariana Islands, Norway, Panama, Paraguay, Peru, Poland, Portugal, Reunion, Russia (southern), Rwanda, Saint Helena, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Slovenia, South Africa, Spain, Sudan, Suriname, Switzerland, Syria, Tanzania, Togo, Tunisia, Turkey, Uganda, United States (Hawaii), Uruguay, Venezuela, West Bank of the Jordan River, Yemen, Zambia, Zimbabwe. Medfly has been intercepted in China, Czech Republic, Estonia, India (no longer present), Lithuania, Luxembourg (no longer present), Netherlands (no longer present), Romania, Slovakia, Sweden and the United Kingdom (no longer present). Adventive populations are no longer present in Austria, Belgium, Germany and Hungary. Medfly has been eradicated from Belize, Bermuda, New Zealand, Ukraine and United States (California, Florida, and Texas). Records of Medfly presence in Jamaica and Puerto Rico are erroneous.

Table A-14 Host List for *Ceratitis capitata*

Scientific	Common
<i>Acca sellowiana</i> (O. Berg) Burret	pineapple guava
<i>Acokanthera oppositifolia</i> (Lam.) Codd	poison bush
<i>Acokanthera shimperi</i> (A. DC.) Benth. & Hook. F. ex Schweinf.	
<i>Actinidia chinensis</i> Planch.	kiwi
<i>Actinidia deliciosa</i> (A. Chev.) C.F. Liang & A.R. Ferguson	gooseberry
<i>Anacardium occidentale</i> L.	cashew
<i>Annona cherimola</i> Mill.	cherimoya
<i>Annona muricata</i> L.	soursop
<i>Annona reticulata</i> L.	custard apple
<i>Antidesma venosum</i> E. Mey. Ex Tul.	tassel-berry
<i>Arbutus pavarii</i> Pamp.	strawberry-tree
<i>Arbutus unedo</i> L.	strawberry-tree
<i>Arenga pinnata</i> (Wurmb.) Merrill	sugar palm
<i>Argania spinosa</i> (L.) Skeels	argantree

Pest Information

Mediterranean Fruit Fly (*Ceratitis capitata*)

Table A-14 Host List for *Ceratitis capitata* (continued)

Scientific	Common
<i>Artabotrys monteiroae</i> Oliv.	
<i>Artocarpus altilis</i> (Parkinson) Fosberg	breadfruit
<i>Asparagus</i> sp.	asparagus
<i>Averrhoa bilimbi</i> L.	bilimbi
<i>Averrhoa carambola</i> L.	starfruit
<i>Azima tetracantha</i> Lam.	
<i>Berberis holstii</i> Engl.	
<i>Blighia sapida</i> K.D. Koenig	akee
<i>Bouyeria petiolaris</i> (Lam.) Thulin	
<i>Brucea antidysenterica</i> J.F. Mill.	
<i>Butia capitata</i> (Mart.) Becc.	coco palm
<i>Calophyllum inophyllum</i> L.	ball kamani
<i>Calophyllum tacamahaca</i> Willd.	
<i>Calotropis procera</i> (Aiton) W.T. Aiton	Sodom apple
<i>Campomanesia sessiliflora</i> (O Berg.) Mat-tos	
<i>Cananga odorata</i> (Lam.) Hook. F. & Thom-son	Macassar oiltree
<i>Capparis sandwichiana</i> DC.	puapilo
<i>Capparis sepiaria</i> L.	
<i>Capparis spinosa</i> L.	caperbush
<i>Capsicum annuum</i> L.	bell pepper
<i>Capsicum chinense</i> Jacq.	bonnet pepper
<i>Capsicum frutescens</i> L.	tobasco pepper
<i>Carica papaya</i> L.	papaya
<i>Carissa bispinosa</i> (L.) Desf. Ex Brenan	natal plum
<i>Carissa carandas</i> L.	Bengal-currants
<i>Carissa longiflora</i> (Stapf) G. H.M. Lawr.	
<i>Carissa macrocarpa</i> (Eckl.) A. DC.	natal plum
<i>Carissa spinarum</i> L.	Egyptian carissa
<i>Carissa tetramera</i> (Sacleux) Stapf.	
<i>Carya illinoensis</i> (Wangenh.) K. Koch	pecan
<i>Casimiroa edulis</i> La Llave & Lex.	white sapote
<i>Cestrum nocturnum</i> L.	night jessamine
<i>Chrysobalanus icaco</i> L.	cocoplum
<i>Chrysophyllum argyrophyllum</i> Hiern	
<i>Chrysophyllum cainito</i> L.	star-apple
<i>Chrysophyllum gonocarpum</i> (Mart & Eichler) Engl.	
<i>Chrysophyllum oliviforme</i> L.	wild star-apple

Table A-14 Host List for *Ceratitis capitata* (continued)

Scientific	Common
<i>Chrysophyllum polynesianum</i> Hillebr.	
<i>Chrysophyllum viridifolium</i> J.M. Wood & Franks	
<i>Cinnamomum verum</i> J. Presl	cinnamon
<i>Citharexylum myrianthum</i> Cham.	
x <i>Citrofortunella microcarpa</i> (Bunge) Wijnands	calamandarin
<i>Citrus aurantiifolia</i> (Christm.) Swingle	Egyptian lime
<i>Citrus aurantium</i> L.	bitter orange
<i>Citrus deliciosa</i> Ten.	Mediterranean mandarin
<i>Citrus jambhiri</i> Lush.	rough lemon
<i>Citrus limettioides</i> Tanaka	Indian sweet lime
<i>Citrus limon</i> (L.) Burm. F.	lemon ¹
<i>Citrus maxima</i> (Burm.) Merr.	pomelo
<i>Citrus medica</i> L.	citron
<i>Citrus medica</i> L. x <i>Citrus aurantium</i> L.	citrangequat
<i>Citrus meyeri</i> Yu. Tanaka	Meyer lemon
<i>Citrus myrtifolia</i> Raf.	myrtle-leaf orange
<i>Citrus nobilis</i> Lour.	mandarin orange
<i>Citrus nobilis</i> Lour. X <i>Citrus paradisi</i> Macfad	
<i>Citrus paradisi</i> Macfad.	grapefruit
<i>Citrus reshni</i> hort. x Tanaka	Cleopatra mandarin
<i>Citrus reticulata</i> Blanco	mandarin orange
<i>Citrus sinensis</i> (L.) Osbeck	orange
<i>Citrus x tangelo</i> J.W. Ingram & H.E. Moore	tangelo
<i>Citrus tangerina</i> Tanaka	tangerine
<i>Citrus unshiu</i> Marcow.	Satsuma mandarin
<i>Clausena anisata</i> (Wild.) Hook. F.	horsewood
<i>Clausena lansium</i> (Lour.) Skeels	Chinese clausena
<i>Coccinia microphylla</i> Gilg.	
<i>Coccoloba uvifera</i> (L.) L.	seagrape
<i>Coffea arabica</i> L.	Arabian coffee
<i>Coffea canephora</i> Pierre ex A. Froehner	robusta coffee
<i>Coffea liberica</i> W. Bull ex Hiern	Liberian coffee
<i>Cola natalensis</i> Oliv.	
<i>Corallocarpus ellipticus</i> Chiov.	
<i>Cordia sebestena</i> L.	geigertree
<i>Corynocarpus laevigatus</i> J.R. Forst. & G. Forst.	
<i>Crataegus azarolus</i> L.	Azarole hawthorn

Pest Information

Mediterranean Fruit Fly (*Ceratitis capitata*)

Table A-14 Host List for *Ceratitis capitata* (continued)

Scientific	Common
<i>Cucumis dipsaceus</i> Ehrenb. Ex Spach	hedgehog cucumber
<i>Cydonia oblonga</i> Mill.	quince
<i>Dimocarpus longan</i> Lour. subsp. <i>longan</i>	longan
<i>Diospyros abyssinica</i> (Hiern) F. White	
<i>Diospyros decandra</i> Lour.	persimmon
<i>Diospyros ebenum</i> J. Koenig	black sapote
<i>Diospyros kaki</i> Thunb.	oriental persimmon
<i>Diospyros mespiliformis</i> Hochst. Ex A. DC.	
<i>Diospyros pallens</i> (Thunb.) F. White	
<i>Diospyros pubescens</i> Pers.	
<i>Dovyalis caffra</i> (Hook. F. & Harv.) Warb.	kai apple
<i>Dovyalis hebecarpa</i> (Gardner) Warb.	Ceylon gooseberry
<i>Drypetes gerrardii</i> Hutch.	
<i>Drypetes natalensis</i> (Harv.) Hutch.	
<i>Ehretia cymosa</i> Thonn.	
<i>Ekebergia capensis</i> Sparrm.	cape-ash
<i>Elaeodendron schweinfurthianum</i> (Loes.) Loes	
<i>Englerophytum magalismontanum</i> (Sond.) T. D. Penn.	
<i>Eriobotrya japonica</i> (Thunb.) Lindl.	loquat
<i>Euclea divinorum</i> Hiern.	
<i>Eugenia brasiliensis</i> Lam.	Brazil cherry
<i>Eugenia involucrata</i> DC.	cherry-of-the-Rio-Grande
<i>Eugenia pyriformis</i> Cambess.	uvaia
<i>Eugenia uniflora</i> L.	Surinam cherry
<i>Ficus carica</i> L.	fig
<i>Filicium decipiens</i> (White & Arn.) Thwaites ex Hook.f.	
<i>Flacourtia indica</i> (Burm. F.) Merr.	governor's plum
<i>Flagellaria guineensis</i> Schumach.	
<i>Flueggea virosa</i> (Roxb. Ex. Willd.) Royle	
<i>Fortunella japonica</i> (Thunb.) Swingle	kumquat
<i>Fortunella margarita</i> (Lour.) Swingle	oval kumquat
<i>Fragaria chiloensis</i> (L.) Mill.	strawberry
<i>Frangula californica</i> (Eschsch.) A. Gray subsp. <i>californica</i>	buckthorn
<i>Garcinia brasiliensis</i> Mart.	
<i>Garcinia mangostana</i> L.	mangosteen
<i>Garcinia xanthochymus</i> Hook.f.	gourka
<i>Gmelina arborea</i> Roxb.	gmelina

Table A-14 Host List for *Ceratitis capitata* (continued)

Scientific	Common
<i>Gossypium hirsutum</i> L.	American cotton
<i>Grewia trichocarpa</i> Hochst. ex A. Rich	
<i>Guettarda speciosa</i> L.	sea randa
<i>Hancornia speciosa</i> Gomes	
<i>Harpephyllum caffrum</i> Bernh. Ex C. Krauss	Kaffir date
<i>Harrisonia abyssinica</i> Oliv.	
<i>Hexachlamys edulis</i> (O. Berg) Kausel & D. Legrand	cereja-d-Rio-Grande
<i>Inga feuille</i> DC.	pacae
<i>Inga laurina</i> (Sw.) Willd.	
<i>Inga sellowiana</i> Benth.	
<i>Juglans australis</i> Griseb.	Argentine walnut
<i>Juglans nigra</i> L.	black walnut
<i>Juglans regia</i> L.	walnut
<i>Juglans</i> spp.	walnut with husk
<i>Lagenaria siceraria</i> (Mol.) Standl.	calabash
<i>Lamprothamnus zanguebaricus</i> Hiern	
<i>Latania loddigesii</i> Mart.	blue latan palm
<i>Licania tomentosa</i> (Benth.) Fritsch	
<i>Litchi chinensis</i> Sonn.	litchi
<i>Ludia mauritiana</i> J.F. Gmel.	
<i>Lycium campanulatum</i> E. Mey. ex C.H. Wr.	
<i>Lycium europaeum</i> L.	boxthorn
<i>Lycium shawii</i> Roem. & Schult	
<i>Lycium subglubosum</i> L.	Chinese matrimony vine
<i>Malpighia emarginata</i> DC.	acerola
<i>Malpighia glabra</i> L.	Barbados cherry
<i>Malus domestica</i> Borkh.	apple
<i>Malus floribunda</i> Siebold ex Van Houtte	purple chokeberry
<i>Malus sylvestris</i> (L.) Mill.	crab apple
<i>Mangifera indica</i> L.	mango
<i>Manilkara butugi</i> Chiov.	
<i>Manilkara sansibarensis</i> (Engl.) Dubard	
<i>Manilkara sulcata</i> (Engl.) Dubard	
<i>Manilkara zapota</i> (L.) P. Royen	chicle
<i>Mespilus germanica</i> L.	medlar
<i>Miliusa brahei</i> (F. Muell.) Jessup	
<i>Mimusops bagshawei</i> S. Moore	
<i>Mimusops caffra</i> E. Mey. ex A. DC.	coastal red milkwood
<i>Mimusops elengi</i> L.	medlar

Pest Information

Mediterranean Fruit Fly (*Ceratitis capitata*)

Table A-14 Host List for *Ceratitis capitata* (continued)

Scientific	Common
<i>Mimusops kirkii</i> Baker	
<i>Mimusops kummel</i> Bruce ex A. DC.	
<i>Mimusops obtusifolia</i> Lam.	
<i>Mimusops zeyheri</i> Sond.	Transvaal red milkwood
<i>Momordica charantia</i> L.	balsam apple
<i>Monodora grandidieri</i> Baill.	
<i>Morus alba</i> L.	white mulberry
<i>Morus nigra</i> L.	black mulberry
<i>Morus rubra</i> L.	red mulberry
<i>Mouriri elliptica</i> Mart.	
<i>Muntingia calabura</i> L.	Panama berry
<i>Murraya exotica</i> L.	Burmese boxwood
<i>Murraya paniculata</i> (L.) Jack	Chinese box
<i>Musa acuminata</i> Colla	banana
<i>Musa x paradisiaca</i> L.	plantain
<i>Myricanthes pungens</i> (O. Berg) D. Legrand	
<i>Myrianthus arboreus</i> P. Beauv.	
<i>Neocarya macrophylla</i> (Sabine) Prance	gingerbread plum
<i>Nephelium lappaceum</i> L.	rambutan
<i>Nitraria retusa</i> (Forssk.) Asch.	nitre bush
<i>Noronhia emarginata</i> (Lam.) Thouars	Chinese plum
<i>Ochrosia elliptica</i> Labill.	scarlet wedge-apple
<i>Olea europaea</i> L. subsp. <i>cuspidata</i> (Wall. Ex G. Don Cif.)	European olive
<i>Olea woodiana</i> Knobl.	olive
<i>Opilia amentacea</i> Roxb.	
<i>Opuntia ficus-indica</i> L. Mill.	mission pricklypear
<i>Opuntia humifusa</i> (Raf.) Raf.	pricklypear
<i>Opuntia</i> spp.	Opuntia cactus
<i>Oxyanthus zanguebaricus</i> (Hiern) Bridson	
<i>Passiflora alata</i> Curtis	wingstem passionflower
<i>Passiflora caerulea</i> L.	passionflower
<i>Passiflora edulis</i> Sims	purple granadilla
<i>Passiflora ligularis</i> Juss.	sweet granadilla
<i>Passiflora suberosa</i> L.	cork passionflower
<i>Pentarthropalopilia umbellulata</i> (Baill.) Hiepko	
<i>Peponium mackenii</i> (Naudin) Engl.	
<i>Pereskia aculeata</i> Mill.	Barbados gooseberry
<i>Persea americana</i> Mill.	avocado
<i>Phoenix dactylifera</i> L.	date palm

Table A-14 Host List for *Ceratitis capitata* (continued)

Scientific	Common
<i>Phyllanthus acidus</i> (L.) Skeels	Ceylon gooseberry
<i>Physalis peruviana</i> L.	cape gooseberry
<i>Pithecellobium dulce</i> (Roxb.) Benth.	blackbead
<i>Podocarpus elongatus</i> (Ait.) L'Her.ex Pers.	
<i>Polysphaeria parvifolia</i> R.D. Good	
<i>Poncirus trifoliata</i> (L.) Raf.	hardy orange
<i>Pouteria caimito</i> (Ruiz & Pav.) Radlk.	caimito
<i>Pouteria campechiana</i> (Kunth) Baehni	canistel
<i>Pouteria ramiflora</i> (Mart.) Radlk.	
<i>Pouteria sapota</i> (Jacq.) H.E. Moore and Stearn	mammee sapote
<i>Pouteria viridis</i> (Pittier) Cronquist	injerto
<i>Prunus africana</i> (Hook. F.) Kalkman	African cherry
<i>Prunus americana</i> Marshall	American plum
<i>Prunus armeniaca</i> L.	apricot
<i>Prunus avium</i> (L.) L.	sweet cherry
<i>Prunus cerasifera</i> Ehrh.	cherry plum
<i>Prunus cerasus</i> L.	dwarf cherry
<i>Prunus domestica</i> L. subsp. <i>domestica</i>	European plum
<i>Prunus domestica</i> L. subsp. <i>insititia</i> (L.) C.K. Schneid.	bullace plum
<i>Prunus dulcis</i> (Mill.) D.A. Webb	almond with husk
<i>Prunus ilicifolia</i> (Nutt. Ex Hook. & Arn.) D. Dietr.	wild cherry
<i>Prunus mume</i> Siebold & Zucc.	Japanese apricot
<i>Prunus persica</i> (L.) Batsch	peach
<i>Prunus persica</i> (L.) Batsch var. <i>nucipersica</i> (Suckow) C.K. Schneid	nectarine
<i>Prunus salicina</i> Lindl.	willow-leaf cherry
<i>Prunus salicina</i> Lindl. X <i>Prunus cerasifera</i> J.F. Ehrh.	Methley plum
<i>Prunus serotina</i> Ehrh. var. <i>salicifolia</i> (Kunth) Koehne	capulin cherry
<i>Psidium cattleyanum</i> Sabine var. <i>cattleyanum</i>	Cattley guava
<i>Psidium cattleyanum</i> Sabine var. <i>littorale</i> (Raddi) Fosberg	strawberry guava
<i>Psidium friedrichsthalianum</i> (O. Berg) Nied.	Costa Rican guava
<i>Psidium guajava</i> L.	guava
<i>Psidium guineense</i> Sw.	Brazilian guava
<i>Punica granatum</i> L.	pomegranate
<i>Pyrus communis</i> L.	pear

Pest Information

Mediterranean Fruit Fly (*Ceratitis capitata*)

Table A-14 Host List for *Ceratitis capitata* (continued)

Scientific	Common
<i>Pyrus pyrifolia</i> (Burm. F.) Nakai	
<i>Rhamnus alaternus</i> L.	blow-fly-bush
<i>Rhamnus lycioides</i> L.	buckthorn
<i>Richardella campechiana</i> (Kunth) Pierre	
<i>Rosa</i> sp.	rose
<i>Rubus idaeus</i> L.	raspberry
<i>Rubus lucidus</i> Rydb.	blackberry
<i>Salacia elegans</i> Welw. ex Oliv.	
<i>Salpichroa organifolia</i> (Lam.) Thell.	
<i>Sandoricum koetjape</i> (Burm. F.) Merr.	santol
<i>Santalum album</i> L.	sandalwood
<i>Santalum freycinetianum</i> cv. <i>littorale</i> Gaud.	beach sandalwood
<i>Scaevola plumieri</i> (L.) Vahl	goodenia beechberry
<i>Scaevola taccada</i> (Gaertn.) Roxb.	
<i>Sideroxylon foetidissimum</i> Jacq. subsp. <i>foetidissimum</i>	mastic ironwood
<i>Sideroxylon inerme</i> L.	ironwood
<i>Simmondsia chinensis</i> (Link) C.K. Schneid	goatnut
<i>Solanum aethiopicum</i> L.	
<i>Solanum anguivi</i> Lam.	apple-of-Sodom
<i>Solanum betaceum</i> Cav.	tree tomato
<i>Solanum coagulans</i> Forssk.	
<i>Solanum glaucophyllum</i> Desf.	
<i>Solanum linnaeanum</i> Hepper & P.-M. L. Jaeger	poison apple
<i>Solanum lycopersicon</i> L. var. <i>lycopersicon</i>	tomato ²
<i>Solanum lycopersicum</i> L. var. <i>cerasiforme</i> (Alef.) Fosberg	cherry tomato
<i>Solanum macrocarpon</i> L.	African eggplant
<i>Solanum mauritianum</i> Scop.	bugtree
<i>Solanum melongena</i> L.	eggplant ³
<i>Solanum monanthum</i> Dammer	
<i>Solanum muricatum</i> Aiton	shrub melon
<i>Solanum nigrum</i> L.	blackberry nightshade
<i>Solanum pimpinellifolium</i> L.	currant tomato
<i>Solanum pseudocapsicum</i> L.	Jerusalem cherry
<i>Solanum scabrum</i> Mill.	garden huckleberry
<i>Solanum seaforthianum</i> Andrews	black nightshade
<i>Solanum sisymbriifolium</i> Lam.	bitter dense-thorn apple
<i>Solanum torvum</i> Sw.	turkey berry

Table A-14 Host List for *Ceratitis capitata* (continued)

Scientific	Common
<i>Spondias dulcis</i> Sol. e Parkinson	golden apple
<i>Spondias mombin</i> L.	yellow mombin
<i>Spondias purpurea</i> L.	purple mombin
<i>Sterculia apetala</i> (Jacq.) Karst	Panama tree
<i>Strychnos decussata</i> (Pappe) Gilg	
<i>Strychnos henningsii</i> Gilg	
<i>Strychnos potatorum</i> L.f.	
<i>Strychnos pungens</i> Soler.	wild orange
<i>Synsepalum dulcificum</i> (Schumach.) Daniell	miracle fruit
<i>Syzygium cumini</i> (L.) Skeels	jambolan
<i>Syzygium jambos</i> (L.) Alston	rose apple
<i>Syzygium malaccense</i> (L.) Merr. & L.M. Perry	mountain apple
<i>Syzygium paniculatum</i> Gaertn.	magenta lill-pilly
<i>Syzygium samarangense</i> (Blume) Merr. & L.M. Perry	java apple
<i>Terminalia catappa</i> L.	tropical almond
<i>Terminalia chebula</i> Retz.	natal plum
<i>Terminalia petiolaris</i> A. Cunn. Ex Benth.	
<i>Thevetia peruviana</i> (pers.) K. Schumm.	yellow oleander
<i>Triphasia trifolia</i> (Burm. F.) P. Wilson	limeberry
<i>Vaccinium corymbosum</i> L.	blueberry
<i>Vaccinium</i> spp.	blueberry
<i>Vangueria infausta</i> Burch.	medlar
<i>Vasconcellea quercifolia</i> A. St.-Hil.	baby papaya
<i>Vepris lanceolata</i> (Lam.) G. Don	white ironwood
<i>Vepris nobilis</i> (Delile) Mziray	
<i>Vepris simplicifolia</i> (Engl.) Mziray	
<i>Vepris trichocarpa</i> (Engl.) Mziray	
<i>Vitis</i> spp.	grapes
<i>Vitis labrusca</i> L.	fox grape
<i>Vitis vinifera</i> L.	grape
<i>Wikstroemia phillyreifolia</i> A. Gray	akia
<i>Ximenia americana</i> L.	yellow plum
<i>Ximenia caffra</i> Sond.	
<i>Ziziphus jujuba</i> Mill.	jujube
<i>Ziziphus lotus</i> (L.) Lam.	lotus
<i>Ziziphus mauritiana</i> Lam.	Indian jujube
<i>Ziziphus spina-christi</i> L. Desf.	Christ's thorn

Pest Information

Mediterranean Fruit Fly (*Ceratitis capitata*)

- 1 Smooth-skinned lemons harvested for packing by commercial packinghouses are not regulated for the Mediterranean fruit fly.
- 2 Only pink and red ripe tomatoes are regulated articles for the Mediterranean fruit fly.
- 3 Commercially produced eggplants are not regulated articles for the Mediterranean fruit fly.

General Information

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Introduction

The information in this chapter contains general information and recommendations that could be used in the fruit fly trapping program.

General Information

Recommended Traps and Lures

Recommended Traps and Lures

Table B-1 Recommended Traps and Lures for Exotic Fruit Flies¹

Target Fruit Fly		McPhail Trap 10 % PG + Water	Multilure® Trap 10 % PG + Water			Jackson Trap Sticky Board Insert		
		TY	TY	2C	3C	TML	ME 1	CUE 5
Anastrepha spp.	Mexican, <i>A. ludens</i>	X	X	X				
	South American, <i>A. fraterculus</i>	X	X	X				
	West Indian, <i>A. obliqua</i>	X	X	X				
	sapote, <i>A. serpentina</i>)	X	X	X				
	guava, <i>A. striata</i>	X	X	X				
	Caribbean, <i>A. suspensa</i>	X	X	X				
Bactrocera spp.	white striped, <i>B. albistrigata</i>	X	X					X
	guava, <i>B. correcta</i>	X	X				X	
	melon, <i>B. cucurbitae</i>	X	X					X
	Oriental, <i>B. dorsalis complex</i> ; <i>B. papayae</i> , <i>B. philippinensis</i> , <i>B. carambolae</i> , etc.	X	X				X	
	<i>B. facialis</i>	X	X					X
	solanum, <i>B. latifrons</i>	X	X					
	Queensland, <i>B. tryoni</i>	X	X					X
	peach, <i>B. zonata</i>	X	X				X	
Ceratitis spp.	Mediterranean, <i>C. capitata</i>	X	X		X	X		
	natal, <i>C. rosa</i>	X	X		X	X		

¹ Propylene glycol (PG), Torula yeast (TY), 2-component lure (2C), 3-component lure(3C), Trimedlure (TML), Methyl-eugenol 1 % dibrom (ME 1), Cuelure 5% dibrom (CUE 5)

Trapping Property Map

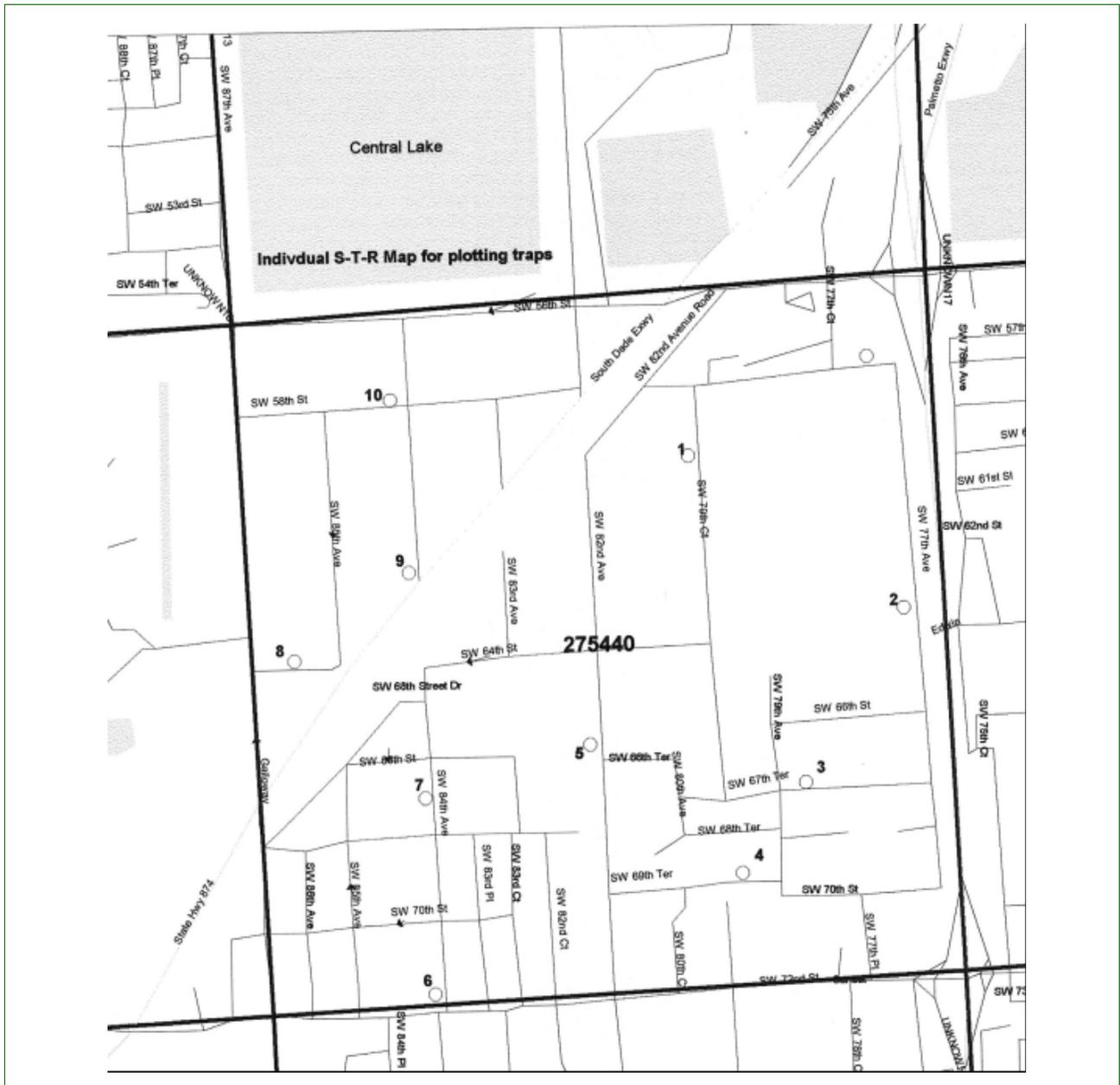


Figure B-1 Example of Trapping Property Map

Property Survey Record (05/1999)

FFD-2 _____ **PROPERTY SURVEY RECORD** _____

(Trap Type) Section 570.32 (1), (5), (6), F.S. (Beginning Year)

LEGEND:						TRAPLINE							
P. PLACED	SK. SKIPPED					TRAP # _____							
B. BAITED	RL. RELOCATED					CITY _____							
V. SERVICED	M. MISSING/REPLACED					COUNTY _____							
D. DISCARD													
DATE	LOCATION	ACTION CODE	NEW PROPERTY	NUMBER OF FLIES	INSPECTORS INITIALS	DATE	LOCATION	ACTION CODE	NEW PROPERTY	NUMBER OF FLIES	INSPECTORS INITIALS	Address _____ Loc. on prop. _____ Host _____ A Property Diagram S ____ T ____ R ____	
												Address _____ Loc. on prop. _____ Host _____ B Property Diagram S ____ T ____ R ____	
												Address _____ Loc. on prop. _____ Host _____ C Property Diagram S ____ T ____ R ____	
												Address _____ Loc. on prop. _____ Host _____ D Property Diagram S ____ T ____ R ____	

DAC5-06040, Revised 5/99

Figure B-2 Example of a Property Survey Record (05/1999)

References

[APHIS Exotic Fruit Fly Website](#) containing:

- ◆ Exotic Fruit Fly Strategic Plan FY 2011-2015
- ◆ Review of the Fruit Fly Surveillance in the United States
- ◆ Fruit Flies of Mexico Strategic Plan 2008-2013
- ◆ New Pest Response Guidelines and Action Plans
- ◆ Updated fruit fly life cycle models

[California- Insect Trapping Guide- Eleventh Edition 2005](#)

[California Department of Agriculture Exotic Fruit Fly Projects](#)

[Compendium of Fruit Fly Host Information v.1.0\(COFFHI\)](#)

[Florida Fruit Fly Detection Manual- Revision 8 2013](#)

[Trapping Guidelines for Area Wide Fruit Flies Programmes- International Atomic Energy Agency \(IAEA\) 2003.](#)

Supplies, Lures, and MSDS: <https://caps.ceris.purdue.edu/node/281>

References

Glossary

Use this glossary to find the meaning of specialized words, abbreviations, acronyms, and terms.

Definitions, Terms, and Abbreviations

- 2C.** two-component lure
- 3C.** three-component lure
- A.** ammonium acetate
- CUE.** Cuelure (5% Dibrom)
- JT.** Jackson trap
- McP.** McPhail trap
- ME.** methyl-eugenol (1% Dibrom)
- ML.** Multilure trap
- P.** putrescine
- PG.** propylene glycol
- T.** trimethylamine
- TML.** trimedlure
- TSP.** trisodium phosphate
- TY.** torula yeast

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- Bactrocera cucurbitae*
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- Bactrocera dorsalis*
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- Bactrocera latifrons*
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- Bactrocera tryoni*
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