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Department of  
Agriculture**

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Animal and  
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Inspection  
Service

Plant Protection  
and Quarantine

# **Guidelines for Fruit Fly Systems Approach to Support the Movement of Regulated Articles between Mexico and the United States**

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## I. Introduction

The purpose of this document is to delineate specific technical guidelines for application of a systems approach to mitigate the risk for the introduction of fruit flies of quarantine significance posed by the exportation of fruit fly host material between Mexico and the United States. The target species include fruit flies of economic importance in the family Tephritidae. The two primary components to the systems approach as applied to tephritids are the sterile insect technique (SIT) and areas of low pest prevalence. Areas of low pest prevalence can occur naturally, or be established through a coordinated control and suppression program. If no geographic or biological barriers exist to prevent introduction of pests into the regulated area from adjacent areas of high pest prevalence, then it is necessary to establish a buffer zone. The nature of the control measures employed and the size of the buffer zone will depend upon the particular characteristics of each regulated area and the target pest.

These technical guidelines for systems approach are consistent with the Mexican fruit fly Quarantine, 7 CFR 301.64 that regulates the interstate movement of regulated articles and the Mexican Standards NOM-023-FITO-1995 and NOM-075-FITO-1997 regarding fruit flies and fruit movement in Mexico and the United States. Certification of citrus from the Lower Rio Grande Valley and the Mexican states of Tamaulipas and Nuevo Leon has been achieved under the respective regulations, in part, through sterile fly releases, detection activities, and commodity treatment. Certification of regulated areas under a systems approach is also consistent with Article 6 of the WTO Agreement on the Application of Sanitary and Phytosanitary Measures.

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## II. Objective

The objective of these technical guidelines is to delineate specific phytosanitary measures that are integral to establish a systems approach to mitigate the risk of fruit fly introductions and to facilitate the commercial shipment of fruit between Mexico and the United States.

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## III. Protocol Area

The following information shall be provided for each place of production to be included in the protocol area. The completed tables will be supported by a written description of each area and maps that clearly indicate both the total area, the places of production, and buffer zones. The size of the buffer zone will depend upon the particular characteristics of each regulated area and the target pest. This will be agreed upon in the bilateral work plan required for each protocol area.

### A. Total Area Description

**TABLE 1: Description of the Total Area**

Area Type	Area (km <sup>2</sup> /mi <sup>2</sup> )	Host Material	Urban/Rural	Non-host Material
Place of production				
Buffer				
Total protocol area				

To complete **Table 1**, provide values for area, describe the fruit or host material within the production zone, select urban or rural, and describe the type of non-host material within the production area.

**Map 1.** Regional map that includes the protocol area (production and buffer area).

### B. Production Zone Description

**TABLE 2: Description of the Production Zones within the Protocol Area**

Production Zone	Area (km <sup>2</sup> /mi <sup>2</sup> )	Characteristics and Location
Zone 1		
Zone 2		
Zone 3		
Zone 4		
ETC		

**Map 2.** Treatment area map that includes the production and buffer areas with the trapping grids, delimiting production zone, and control zone.

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## IV. Certification Procedures

### A. Preventive Release Program

Sterile target pests will be released at a recommended rate of 1,000 flies/hectare/wk (500 flies/acre/wk) on a continuous basis over native, commercial, and urban hosts. Release can be by air or ground. Ground release criteria should be delineated in the bilateral work plan.

## B. Trapping Program

A trapping program for the target pest will be operated in accordance with approved trapping and quality control guidelines. Trapping will occur in native, commercial and urban areas wherever native and introduced hosts occur. Employees of the National Plant Protection Organization (NPPO) will conduct trapping. Traps should be deployed using an overlaying grid with each 1 km<sup>2</sup> divided into two sections or each 1 mi<sup>2</sup> divided equally into five sections, as appropriate. Those sections of 1 km<sup>2</sup> or 1 mi<sup>2</sup> grid that are devoid of hosts (e.g., rangeland) will not be trapped. Traps will be serviced weekly throughout the year. Traps will be rotated at least once every three months. A trapping program for both the target species and non-target pest fruit flies will be deployed in the protocol area according to the same guidelines.

Surveys for fruit flies that do not respond to parapheromones should be conducted with a trap such as the invaginated McPhail or Multilure baited with food-based attractants, the sticky Pherocon AM using ammonium acetate and putrescine, or an accepted equivalent trap/bait combination. Trap density should be 2 traps per km<sup>2</sup> (5 traps per mi<sup>2</sup>) and servicing once per week.

Surveys for fruit flies that respond to parapheromones should be conducted with the Jackson trap (or other traps with demonstrated equal or better efficiency, i.e., sticky yellow Champ or C&C traps, the three component lure traps) baited with trimedlure, ceralure, capilure, cuelure, or methyl eugenol as appropriate. The trap density should be 2 traps per km<sup>2</sup> (5 traps per mi<sup>2</sup>) and servicing at least once every 2 weeks.

Flies collected during the trapping program will be screened to determine their sterile/wild status and their classification to species. Processing of flies will be under the supervision of NPPO personnel. All trapped specimens will be submitted to staff with specific training in fruit fly identification. When the identification of a wild target pest has been confirmed, NPPO personnel will make an assessment of the target pest capture relative to its impact on the protocol.

The NPPO should establish a quality control program for the survey to verify and document that all protocols are met. The key elements of the quality control program would include the following:

- ◆ Verification of lure efficacy
- ◆ Placement and recovery of marked target flies
- ◆ Regular reviews of survey documentation
- ◆ Audits of trap placement and servicing
- ◆ Confirmation of identifier competency

### C. Response To Target Fruit Fly Pest Detection

The detection of one wild target pest will initiate a delimiting survey, fruit cutting, and control actions.

#### 1. Delimiting trapping survey

Delimiting trapping shall be conducted to determine if an infestation exists; and if so, the extent of the infestation. Upon capture of a single target pest, the placement of an additional six (6) traps within the remaining 250 m radius outside the treatment area will be required.

#### 2. Fruit Cutting

Fruit cutting will be initiated within 250 meters (0.16 mi) of the target pest capture to determine if an infestation exists. Fruit cutting will occur at 10-day intervals for a period of one life cycle. Physiologically mature or ripening fruit will be collected from the ground or tree, 200 fruit per sample. When a wild target pest is captured in an orchard or field, any fruit from that orchard or field that is in the packing shed or harvested during the 14 days following the capture must be segregated and held if destined for shipment to a citrus-producing state free of fruit flies. If no subsequent wild target pests or larvae are found within 1.6 km (1 mile) of the initial detection during the 14-day period, the fruit is eligible for shipment without treatment. If a subsequent wild target pest is captured or a larva is found in fruit during the 14-day period, the fruit being held will be considered infested and will be ineligible for shipment without treatment. Fruit being held will be tracked back to the grower. Upon capture of a wild target pest, that information will be given to the packinghouse within 24 hrs.

#### 3. Control Measures

The detection of one wild target pest will initiate **one** of the following control measures:

##### a. Release of sterile flies.

Weekly aerial or ground release of additional sterile flies should take place within a 500 m radius of the target pest detection site. These releases should begin within 72 hours of the detection and continue for two life cycles. The number of steriles released should be 2,000 sterile flies per hectare (500,000 sterile flies per mi<sup>2</sup>); this is equivalent to 160,000 sterile flies within a 500 m radius of the detection. Ground release parameters to insure even distribution of the flies should be delineated in the bilateral work plan.

- b. Ground or aerial application of five (5) spinosad plus solbait bait sprays.

Spinosad treatments (**Table 3**) shall be in a 250 m radius (0.16 mi) of the target pest detection and should be made at 7, but not to exceed 10, day intervals. The application rate is 13 to 26 ml (0.5 to 1.0 ounce) per tree (based upon size of host tree) in urban areas, or 4 liters per hectare (54 ounces per acre) in orchards. Bait spray treatments should be terminated upon regulation of the production zone.

- c. Ground or aerial application of five (5) malathion plus nulure (or equivalent approved) bait sprays.

Malathion treatments (**Table 3**) shall be in a 250 m radius (0.16 mi) of the target pest detection and should be made at 6, but not to exceed 10, day intervals. The application of malathion bait spray will be 125 to 250 ml (4 to 8 ounces) of bait per tree (based on size of host tree) or 20 liters per hectare by ground application or 1 liter of bait spray by aerial application. Bait spray treatments will be terminated upon regulation of the respective production zone.

**TABLE 3: Formulation of Spinosad and Malathion for Ground and Aerial Application**

Chemical	Application Method	
	Ground (ratio)	Aerial (ratio)
Malathion	95 Water : 4 Protein : 1 55% CE Malathion	4 Protein : 1 95% AI Malathion
Spinosad	60 Water : 40 Spinosad	60 Water : 40 Spinosad

#### D. Shipment Criteria

Regulated articles cited in 7 CFR 301.64-2(a) (USA) and NOM-075-FITO-1997 (México) may be shipped with certification to all domestic markets, between both countries, provided that **all** of the following criteria are met:

1. Surveillance: The approved production area is under continuous surveillance, using the appropriate trap and lure combination as given in **IV. Certification Procedures, B. Trapping Program**. This program includes native hosts, commercial hosts, dooryard and noncommercial or abandoned orchards.
2. Preventive Release Program: Sterile target pests will be released at a recommended rate of 1,000 flies/hectare/wk (500 flies/acre/wk) on a continuous basis over native, commercial and urban hosts.
3. Detection: No wild target pests have been captured within 1.6 km (1 mi) of where the regulated commodities are harvested.

4. Non-target pests: No infestation of fruit flies of economic importance in the place of production as given in **V. Criteria for Declaration of Infestation**.

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## V. Criteria for Declaration of Infestation

Infestations are declared for each production zone on an independent basis. Local infestation occurs within a production zone. A general infestation encompasses the entire production zone.

### A. Local

A local infestation is defined as detection of:

1. A single target mated female
2. Two or more unmated wild target pests within one life cycle with a separation of less than 1.6 km (1 mi) of each other, **OR**
3. A single target larva found in a fruit

When it has been determined that a local infestation exists, the infested area will be defined as that area within a 1.6 km (1 mi) radius of the target pest capture or larval find. Multiple detections may have overlapping infested areas. Conditions of negligible pest risk no longer exist once it has been determined an infestation exists and more restrictive actions, fumigation, must be taken to ship fruit safely. These restrictions are described in **VI. Approved Treatments**.

### B. General

Criteria for declaration of a general infestation will be:

1. Five percent (5%) of the total 1.6 km<sup>2</sup> (1 mi<sup>2</sup>) blocks being trapped in a production area have captures of one wild target pest.
2. One and a half percent (1.5%) of the total blocks trapped in a production area have two or more wild target pest captures.
3. If infestations are found prior to meeting the conditions in **V. B. 1. or 2.** above, in a pattern that in the judgment of the NPPO constitutes a general infestation or an unmanageable regulatory problem, individual production areas or the entire protocol area will be regulated.

Situations not covered above will be addressed on an individual basis by the NPPO.



## VI. Approved Treatments

Fruit originating and offered for shipment from orchards in infested (local and general) areas will require chemical treatment prior to certification. The approved treatments are fumigation and bait sprays. Within an infested area, there may be circumstances where growers may utilize both fumigation and bait spray treatment. Importing states may have additional requirements that must be met, e.g., treatment for surface pests.

### A. Fumigation

For each fumigation lot the following criteria must be met. Fruit will be fumigated with methyl bromide at a minimum rate of 2.5 pounds (1.14 kg) per 1,000 cubic feet chamber volume (28.34 cubic meters) at a minimum fruit pulp temperature of 70°F (21.1°C) and a maximum fruit pulp temperature of 85°F (29.4°C) for 2 hours in an approved fumigation chamber. Prior to fumigation, the pulp temperature will be taken on 10 randomly selected fruit. All fruit must meet the minimum and maximum temperatures. The chamber will not be loaded beyond 80 % capacity with approved containers. Fumigation will be done under the supervision of NPPO personnel. Treatments will be conducted under conditions outlined in the NPPO Treatment Manual. Areas where growers choose fumigation as a regulatory treatment will remain classified as infested until two life cycles have elapsed after the last target pest capture.

When general infestation thresholds (described in **V. Criteria for Declaration of Infestation, B. General**) are reached in the respective production areas, fruit cutting will be required prior to fumigation at the packing houses. Fruit cutting will be conducted at a rate of 1 fruit for each 120 lbs of fruit (equivalent to 200 fruit for each 24,000 lbs of fruit in a field-truck) in the fumigation lot. Samples will be randomly selected for cutting from **each** of the units (bins, boxes, etc.) that make up the load for treatment. If the treatment lot samples exceed 0.5% infestation rate, the entire treatment lot will be rejected and will be able to be shipped to areas of the country of production with the same phytosanitary status (Work Plan for Mexican Citrus Treatment and Preclearance, 2001).

### B. Bait Spray

Bait sprays may be utilized in place of fumigation when used in the following manner:

A field, orchard, or area that is located within a production area but outside the infested core area (1.6 km<sup>2</sup> or 1 mi<sup>2</sup>) must receive regular treatments with bait spray according to label rates. Malathion or spinosad may be used for the treatments.

Bait spray applications will be made in the treatment area of 250 m radius and any intersecting blocks. Treatments will be conducted under the supervision of the NPPO.

If measurable rainfall (>10 mm) occurs within 12 hours after treatment, the spray must be reapplied. Overhead irrigation systems will not be used for a minimum of 48 hours after treatment.

Production areas under bait spray treatments will remain classified as infested until two life cycles of negative trapping occur after the last treatment.

**1. Malathion**

Malathion bait spray applications must take place at 6- to 10-day intervals, starting not less than one life cycle before harvest, to allow for completion of egg and larval development of the target pest. Spray applications must be initiated within 5 days of declaring an infestation, and once treatments have begun, they must continue through the harvest period. The ground application dosage will be 125 to 250 ml (4 to 8 ounces) per tree or 20 liters per hectare. The aerial application dosage will be 1 liter per hectare (reference table).

**2. Spinosad**

Spinosad plus solbait bait sprays, either ground or aerial may be applied at 7 to 10-day intervals, starting not less than one life cycle before harvest, to allow for completion of egg and larval development of the target pest. Treatments must continue through the harvest period. The application rate will be 13 to 26 ml (0.5 to 1.0 ounce) per tree (based upon size of host tree) in urban areas, or 4 liters per hectare (128 ounces per acre) in orchards. Droplet size of sprays, regardless of application equipment, should be between 4 and 6 mm in diameter.

**C. Other Quarantine Treatment Options**

Other quarantine treatments may include irradiation, vapor heat, cold treatment, and hot water dip. Treatments will be conducted under conditions outlined in the NPPO Treatment Manual. Parameters for the implementation of these treatments under these guidelines should be delineated in a bilateral work plan.

## VII. Regulatory Activities

Regulatory actions may be taken against the packinghouse upon failure to meet any of the following criteria. These actions will be defined in the bilateral work plan.

### A. Identification of Fruit from Infested Areas

Fruit bins moved out of infested areas shall be marked to clearly identify their origin. Upon arrival in the packinghouse, these bins shall be clearly identified and held in a designated segregated area that is partitioned at least one meter (four feet) apart from non-quarantined fruit. Fruit from an infested area shall be held, processed, and packaged separately.

### B. Marking of Cartons

All cartons used for shipping fruit must bear an authorized stamp for entrance into citrus- producing areas. Stamps will be traceable to a specific shipper. Each shipper should maintain a system, approved by the NPPO, that allows trace-back to individual growers/orchards.

1. Shippers/packinghouses will sign the NPPO Compliance Agreement affirming they will follow the conditions listed.
2. An imprint of the authorization stamps and a complete list of stamp holders will be provided to participating organizations.
3. In cases where reusable plastic containers (RPC) are utilized, the date of shipping must be stamped on the authorization card that is affixed to the container.

### C. Inspections

NPPO inspectors will make frequent regulatory compliance inspections to track the origin of the fruit from harvest to packing. If noncompliance is detected, a corrective action will be taken according to established regulatory protocol.

### D. Outreach

An outreach informational program will be formulated as part of the bilateral work plan. The purpose is to explain shipping guidelines and monitor activities to Post Offices, airlines, and private carriers (FEDEX, UPS, DHL).

### E. Check Points

NPPO personnel will periodically inspect fruit shipment at checkpoints along highways to verify compliance.

## VIII. Communication Plan

NPPOs will develop a communication plan that includes an electronic transmission protocol. The responsible parties will develop a plan to share program information in a timely manner. This includes a standard format and timeline for reporting trapping data, number of steriles released and recaptured, and treatment applications.

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## IX. Response to Detection of Other Fruit Fly Pests

### A. Trap Densities

Trap densities in the production areas should be: McPhail trap density is 2 traps/km<sup>2</sup> (5 traps/mi<sup>2</sup>), trimedlure-baited trap density is 2 traps/km<sup>2</sup> (5 traps/mi<sup>2</sup>), methyl eugenol- and cuelure-baited trap density is 1 trap/km<sup>2</sup> (2 traps/mi<sup>2</sup>). The buffer zone with preferred host material is considered to be a medium risk and the trap density should be: McPhail traps at a density of 4 traps per km<sup>2</sup> (10 traps per mi<sup>2</sup>), and trimedlure-, methyl eugenol-, and cuelure baited traps at a density of 2 traps per km<sup>2</sup> (5 traps per mi<sup>2</sup>).

### B. Response

#### 1. *Anastrepha*

The detection of one wild target pest of the *Anastrepha* genus will initiate a delimiting survey, fruit cutting, and control actions. Responses are as given in **IV. Certification Procedures, C. Response To Target Fruit Fly Pest Detection**, of these guidelines.

#### 2. *Ceratitis*

The detection of a single mated female or a single larva or pupa will trigger an 81mi<sup>2</sup> quarantine. The detection of a single unmated wild fly will trigger an 81mi<sup>2</sup> delimiting grid. If a second wild fly is detected within 3 miles and one life cycle of the original detection, then this will trigger a quarantine within this grid.

In a quarantine area, fruit from a core area can only be moved under certification to an approved juicing facility. Fruit outside the core area, but within the quarantine zone, would require fumigation or bait spray treatments (as given in **VI. Approved Treatments**) in order to move out of the quarantine area. The quarantine will be in place for three life cycles (based on degree day models) from the detection of the last fly.

Trapping within the 81mi<sup>2</sup> delimiting grid will be as follows: the trap density at the core will be 100/mi<sup>2</sup>, at the next mi<sup>2</sup> 50/mi<sup>2</sup>, next mi<sup>2</sup> at 25/mi<sup>2</sup>, next mi<sup>2</sup> at 20/mi<sup>2</sup> and the outermost mi<sup>2</sup> at 10/mi<sup>2</sup> (Action Plan for Mediterranean Fruit Fly, *Ceratitidis capitata* (Weidemann), California Department of Food and Agriculture, Plant Health and Pest Prevention Services, December 1999).

### 3. *Bactrocera*

The detection of a single mated female or a single larva or pupa will trigger an 81mi<sup>2</sup> quarantine. The detection of a single unmated wild fly will trigger an 81mi<sup>2</sup> delimiting grid. If a second wild fly is detected within 3 miles and one life cycle of the original detection, then this will trigger a quarantine within this grid.

In a quarantine area, fruit in the core area will only be used for juicing. Fruit outside the core area, but within the quarantine zone, would require fumigation or bait spray treatments (as given in **VI. Approved Treatments**) in order to move out of the quarantine area. The quarantine will be in place for three life cycles (based on degree day models) from the detection of the last fly.

Trapping within the 81mi<sup>2</sup> delimiting grid will be as follows: the trap density at the core will be 25 parapheromone-baited traps and 25 McPhail traps/mi<sup>2</sup>, at the next mi<sup>2</sup> 5 parapheromone-baited traps and 5 McPhail traps/mi<sup>2</sup>, and all other will be 5 parapheromone-baited traps/mi<sup>2</sup> (**Figure 4**). (Action Plan for *Bactrocera* sp., Florida Department of Agriculture and Consumer Services, Division of Plant Industry, February 2001).

### 4. Other Genera

Detection and response to other genera will be delineated in the bilateral work plan.

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## X. Glossary

### Area of low pest prevalence

An area, whether all of a country, part of a country, or all or parts of several countries, as identified by the competent authorities, in which a specific pest occurs at low levels and which is subject to effective surveillance, control or eradication measures. (FAO, 2002).

### Bait spray

Attractive food source mixed with an insecticide for spraying. Against target pest infestations, for the purpose of certifying citrus for unrestricted shipping. For this program, malathion bait spray is applied by aircraft or ground equipment. The rate is 1.2 ounces of technical grade malathion and 9.6 ounces of protein hydrolysate per acre (or current approved rate).

<b>Buffer zone</b>	An area in which a specific pest does not occur or occurs at a low level and is officially controlled, that either encloses or is adjacent to an infested area, an infested place of production, a pest free area, a pest free place of production, or a pest free production site, and in which phytosanitary measures are taken to prevent spread of the pest. (FAO, 2002).
<b>Certificate</b>	A document which is issued for a regulated article by an inspector or by a person operating under a compliance agreement, and which represents that such article is eligible for interstate movement in accordance with these technical guidelines.
<b>Compliance agreement</b>	A written agreement between the NPPO and the person engaged in the business of growing, handling or moving regulated articles, wherein the person agrees to comply with the provisions of these technical guidelines and pertinent NPPO regulations.
<b>Core area</b>	The one (1) square mile area surrounding each target pest detected. Includes entire grove if bisected by boundary.
<b>Day degrees</b>	A mathematical construct combining average temperature over time that is used to calculate the length of a fruit fly life cycle. Day degrees are the product of the following formula, with all temperatures measured in °F:  $[(\text{MinimumDailyTemperature} + \text{MaximumDailyTemperature})]/2 - 54 = \text{DayDegrees}$
<b>Delimiting survey</b>	A survey conducted to establish the boundaries of an area considered to be infested by or free from a pest. (FAO, 2002).
<b>Detection</b>	The discovery of a specimen of the target pest (NAPPO, 2002).
<b>Emergency Action</b>	A prompt phytosanitary action undertaken in a new or unexpected phytosanitary situation (FAO, 2002).
<b>Fruit cutting (sampling)</b>	The sampling of fruit collected from the packing house or picked from the tree. Fruit are sliced in sections and observed for the presence of immature stages of the target pest.
<b>Infestation, general (under a PRP program)</b>	Applies to the entire protocol area or production zones within the protocol area (see Section III), defined by the following criteria: <ul style="list-style-type: none"><li>a. Five percent (5%) of the total 1.6 square kilometer blocks trapped in a production area having one or more wild target pests;</li><li>b. One and a half percent (1½%) of the total blocks being trapped in a production area having two or more wild target pests.</li></ul>

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	<p>c. If infestations are found prior to meeting the conditions on a. and b., then the NPPO may determine a general infestation exists and there is an unmanageable regulatory problem, individual production areas or the entire protocol area will be regulated.</p>
<b>Infestation, local (under a PRP program)</b>	Applies to isolated situations in specific orchard or dooryards. Defined as two or more wild target pests captured within one life cycle and within 1.6 km of each other or finding a single larva in fruit. Results in the regulation of all host commodities within a 1.6 km radius. A number of local infestations may result in an entire production area declared generally infested.
<b>Inspector</b>	Any employee of the NPPO, or other person authorized by the NPPO, in accordance with law to enforce the provisions of these guidelines.
<b>Life cycle</b>	The time required for development of the target pest from egg to egg. The day degree model will be used to calculate this period.
<b>Moved (movement, move)</b>	Shipped, offered for shipment to a common carrier, received for transportation or transported by a common carrier, or carried, transported, moved, or allowed to be moved by any means. “Movement” and “move” shall be construed accordingly.
<b>National Plant Protection Organization (NPPO)</b>	Official service established by a government to discharge the functions specified by the IPPC. (FAO, 2002).
<b>Non-target pest</b>	Fruit flies of economic importance but not specifically addressed by the protocol.
<b>Person</b>	Any individual, partnership, corporation, company, society, association, or other organized group.
<b>Phytosanitary procedure</b>	Any officially prescribed method for implementing phytosanitary regulations including the performance of inspections, tests, surveillance or treatments in connection with regulated pests (FAO, 2002).
<b>Place of production (Production area, protocol area)</b>	Any premises or collection of fields operated as a single production or farming unit. This may include production sites, which are separately managed for phytosanitary purposes.
<b>Preventative Release Program (PRP)</b>	An exclusion program for fruit flies based on the release of sterile flies on a continuous basis.

<b>Regulated article</b>	Any plant, plant product, storage place, packaging, conveyance, container, soil and any other organism, object or material capable of harboring or spreading pests, deemed to require phytosanitary measures, particularly where international transportation is involved (FAO, 2002).
<b>Sanitation (field sanitation)</b>	Removal of host material from the place of production throughout the growing season. Includes removal and disposal of any host material on the tree or ground at the end of the harvest period.
<b>Surveillance</b>	An official process that collects and records data on pest occurrence or absence by survey, monitoring or other procedures (FAO, 2002).
<b>Survey</b>	An official procedure conducted over a defined period of time to determine the characteristics of a pest population or to determine which species occur in an area (FAO, 2002).
<b>Systems approach(es)</b>	The integration of different pest risk management measures, at least two of which act independently, and which cumulatively achieve the appropriate level of phytosanitary protection (FAO, 2002).
<b>Target pest</b>	The designated species, strain, or biotype of plant, animal, or pathogenic agent, injurious to plants or plant products.
<b>Treatment</b>	Officially authorized procedure for the killing or removal of pests or rendering pests infertile (FAO, 2002).

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## XI. References

California Department of Food and Agriculture. 1999. Action Plan for Mediterranean Fruit Fly, *Ceratitis capitata* (Weidemann).

Florida Department of Agriculture and Consumer Services and USDA. 2002. Action Plan for *Bactrocera* and *Dacus* spp.

SAGAR. 1999. Norma Oficial Mexicana NOM-023-FITO-1995, Por la que se establece la Campaña Nacional contra Moscas de la Fruta.

SAGAR. 1997. Norma Oficial Mexicana NOM-075-FITO-1997, Por la que se establecen los requisitos y especificaciones fitosanitarios para la movilización de frutos hospederos de moscas de la fruta.

USDA and SAGARPA. 2001. Work Plan for Mexican Citrus Fruit Treatment and Preclearance.



## XII. Appendixes

### A. Delimiting Grids

**FIGURE 1.a: Number of Traps per Grid Unit (km<sup>2</sup>) in Delimiting Trapping for *Anastrepha* spp.**

2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2
2	2	2	2	8	2	2	2	2
2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2

Service all McPhail traps in the core square kilometer daily for the first seven days and then place on a seven-day schedule for three negative life cycles or until eradication is declared.

**FIGURE 1.b: Number of Traps per Grid Unit (mi<sup>2</sup>) in Delimiting Trapping for *Anastrepha* spp.**

5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5
5	5	5	5	11	5	5	5	5
5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5

Service all McPhail traps in the core square mile daily for the first seven days and then place on a seven-day schedule for three negative life cycles or until eradication is declared.

**FIGURE 2.a: Number of Traps per Grid Unit (km<sup>2</sup>) in Delimiting Trapping for *Ceratitis capitata***

2	2	2	2	2	2	2	2	2
2	4	4	4	4	4	4	4	2
2	4	5	5	5	5	5	4	2
2	4	5	20 <sup>1</sup>	20 <sup>1</sup>	20 <sup>1</sup>	5	4	2
2	4	5	20 <sup>1</sup>	40 <sup>2</sup>	20 <sup>1</sup>	5	4	2
2	4	5	20 <sup>1</sup>	20 <sup>1</sup>	20 <sup>1</sup>	5	4	2
2	4	5	5	5	5	5	4	2
2	4	4	4	4	4	4	4	2
2	2	2	2	2	2	2	2	2

1 10 trimedlure-baited traps and 10 McPhail traps

2 20 trimedlure-baited traps and 20 McPhail traps

All other blocks are trimedlure-baited traps

Service all trimedlure-baited traps and McPhail traps daily for seven negative days, then place on a seven-day schedule for the duration of three negative life cycles or one negative life cycle beyond the last treatment.

**FIGURE 2.b: Number of Traps per Grid Unit (mi<sup>2</sup>) in Delimiting Trapping for *Ceratitis capitata***

10	10	10	10	10	10	10	10	10
10	20	20	20	20	20	20	20	10
10	20	25	25	25	25	25	20	10
10	20	25	50 <sup>1</sup>	50 <sup>1</sup>	50 <sup>1</sup>	25	20	10
10	20	25	50 <sup>1</sup>	100 <sup>2</sup>	50 <sup>1</sup>	25	20	10
10	20	25	50 <sup>1</sup>	50 <sup>1</sup>	50 <sup>1</sup>	25	20	10
10	20	25	25	25	25	25	20	10
10	20	20	20	20	20	20	20	10
10	10	10	10	10	10	10	10	10

1 25 trimedlure-baited traps and 25 McPhail traps

2 50 trimedlure-baited traps and 50 McPhail traps

All other blocks are trimedlure-baited traps

Service all trimedlure-baited traps and McPhail traps daily for seven negative days, then place on a seven-day schedule for the duration of three negative life cycles or one negative life cycle beyond the last treatment.

**FIGURE 3.a: Number of Traps per Grid Unit (km<sup>2</sup>) in Delimiting Trapping for Methyl Eugenol-responding *Bactrocera* and *Dacus***

2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2
2	2	2	4 <sup>1</sup>	4 <sup>1</sup>	4 <sup>1</sup>	2	2	2
2	2	2	4 <sup>1</sup>	10 <sup>2</sup>	4 <sup>1</sup>	2	2	2
2	2	2	4 <sup>1</sup>	4 <sup>1</sup>	4 <sup>1</sup>	2	2	2
2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2

1 2 parapheromone-baited traps and 2 McPhail traps

2 5 parapheromone-baited traps and 5 McPhail traps

All other blocks are at 5 parapheromone-baited traps

Service all methyl eugenol traps daily for seven negative days, then place on a seven-day schedule for the duration of three negative life cycles or one negative life cycle beyond the last treatment.

Service all McPhail traps every three days for the first week and then run every seven days until eradication is declared.

**FIGURE 3.b: Number of Traps per Grid Unit (mi<sup>2</sup>) in Delimiting Trapping for Methyl Eugenol-responding *Bactrocera* and *Dacus***

5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5
5	5	5	10 <sup>1</sup>	10 <sup>1</sup>	10 <sup>1</sup>	5	5	5
5	5	5	10 <sup>1</sup>	50 <sup>2</sup>	10 <sup>1</sup>	5	5	5
5	5	5	10 <sup>1</sup>	10 <sup>1</sup>	10 <sup>1</sup>	5	5	5
5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5
5	5	5	5	5	5	5	5	5

- 1 5 parapheromone-baited traps and 5 McPhail traps
  - 2 25 parapheromone-baited traps and 25 McPhail traps
- All other blocks are at 5 parapheromone-baited traps

Service all methyl eugenol traps daily for seven negative days, then place on a seven-day schedule for the duration of three negative life cycles or one negative life cycle beyond the last treatment.

Service all McPhail traps every three days for the first week and then run every seven days until eradication is declared.

**FIGURE 4.a: Number of Traps per Grid Unit (km<sup>2</sup>) in Delimiting Trapping for Cuelure-responding *Bactrocera* and *Dacus***

2	2	2	2	2	2	2	2	2
2	4	4	4	4	4	4	4	2
2	4	6	6	6	6	6	4	2
2	4	6	12 <sup>1</sup>	12 <sup>1</sup>	12 <sup>1</sup>	6	4	2
2	4	6	12 <sup>1</sup>	22 <sup>2</sup>	12 <sup>1</sup>	6	4	2
2	4	6	12 <sup>1</sup>	12 <sup>1</sup>	12 <sup>1</sup>	6	4	2
2	4	6	6	6	6	6	4	2
2	4	4	4	4	4	4	4	2
2	2	2	2	2	2	2	2	2

1 10 parapheromone-baited traps and 2 McPhail traps

2 20 parapheromone-baited traps and 2 McPhail traps

All other blocks are at 2 parapheromone-baited traps

Service all cuelure-baited Jackson traps daily for seven negative days, then place on a seven-day schedule for the duration of three negative life cycles or one negative life cycle beyond the last treatment.

Service all McPhail traps every 3 days for the first week and then run every seven days until eradication is declared.

**FIGURE 4.b: Number of Traps per Grid Unit (mi<sup>2</sup>) in Delimiting Trapping for Cuelure-responding *Bactrocera* and *Dacus***

5	5	5	5	5	5	5	5	5
5	10	10	10	10	10	10	10	5
5	10	15	15	15	15	15	10	5
5	10	15	30 <sup>1</sup>	30 <sup>1</sup>	30 <sup>1</sup>	15	10	5
5	10	15	30 <sup>1</sup>	55 <sup>2</sup>	30 <sup>1</sup>	15	10	5
5	10	15	30 <sup>1</sup>	30 <sup>1</sup>	30 <sup>1</sup>	15	10	5
5	10	15	15	15	15	15	10	5
5	10	10	10	10	10	10	10	5
5	5	5	5	5	5	5	5	5

1 25 parapheromone-baited traps and 5 McPhail traps

2 50 parapheromone-baited traps and 5 McPhail traps

All other blocks are at 5 parapheromone-baited traps

Service all cuelure-baited Jackson traps daily for seven negative days, then place on a seven-day schedule for the duration of three negative life cycles or one negative life cycle beyond the last treatment.

Service all McPhail traps every 3 days for the first week and then run every seven days until eradication is declared.



## **B. Elements of the Bilateral Work Plan**

The following is a list of elements that should be included in a bilateral work plan to establish a systems approach area:

- 1.** Geographic description of the proposed area
  - a. maps
  - b. places of production
  - c. natural barriers
  - d. buffer zone
  - e. size
  - f. location of regulatory control check points
- 2.** Survey protocols for establishment and maintenance of the proposed area
  - a. trap type
  - b. bait or lure type
  - c. target pest
  - d. density of traps
  - e. servicing intervals
  - f. reporting of survey results
- 3.** Quality control protocols for surveillance
  - a. verification of surveillance activities
  - b. verification of lure efficacy
  - c. placement and recovery of marked target pests
  - d. regular reviews of survey documentation
  - e. audits of trap placement and servicing
  - f. confirmation of identifier competency
- 4.** Movement controls
  - a. sampling records
  - b. identification of intercepted specimens
  - c. verification of documents
  - d. confirmation that required treatments occurred
  - e. documentation of any other phytosanitary procedures
- 5.** Emergency Action Plan
  - a. trigger for plan implementation
  - b. delimiting survey
  - c. mitigation measures

