

**HG97027**

**National contingency plan to incursion of  
Melon Fly *Bactrocera cucurbitae*  
(Coquillett) in Australia**

**B Cantrell, *et al*  
QDPI**



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# **NATIONAL CONTINGENCY PLAN**

for

response to an incursion of

## **MELON FLY**

*Bactrocera cucurbitae* (Coquillett)

(Diptera: Tephritidae)

**in Australia**

*Prepared for*

*Horticultural Research and Development Corporation*

*by*

*Queensland Department of Primary Industries*

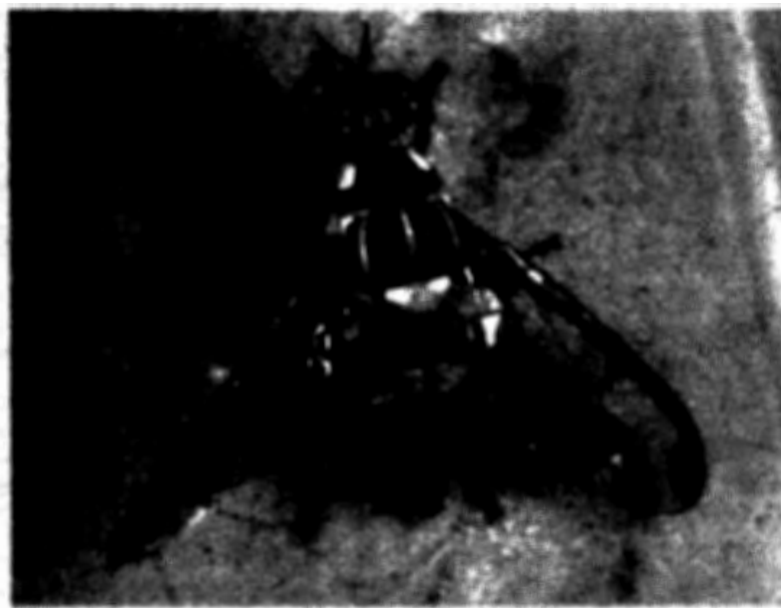
April 1999

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## ACRONYMS and ABBREVIATIONS

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ABARE	Australian Bureau of Agricultural Resource Economics
AFFA	Agriculture, Fisheries and Forestry - Australia
AQIS	Australian Quarantine and Inspection Service
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
IPHRWG	Interstate Plant Health Regulation Working Group
NAQS	Northern Australia Quarantine Strategy
NRA	National Registration Authority for Agricultural and Veterinary Chemicals
PFF	Papaya Fruit Fly ( <i>Bactrocera papayae</i> Drew and Hancock)
PHC	Plant Health Committee
PHC CC	Plant Health Committee, Consultative Committee
QDPI	Queensland Department of Primary Industries
QFF	Queensland Fruit Fly ( <i>Bactrocera tryoni</i> (Froggatt))
SCARM	Standing Committee on Agriculture and Resource Management



Melon fly (adult female) - *Bactrocera cucurbitae* (Coquillett)

Photograph provided by Dr T Teruya, Fruit Fly Eradication Project Office, Okinawa Prefectural Government, Naha 902, Japan.

## INTRODUCTION

This Contingency Plan outlines the procedures which should be followed if melon fly, *Bactrocera cucurbitae* (Coquillett), is detected in Australia.

Melon fly occurs in Asia, Africa and the Pacific Islands. Overseas experience indicates that it is a serious pest of all cucurbits including rockmelons, pumpkins, watermelon, zucchinis and squash. It also attacks a wide range of other hosts including tomatoes, French beans and citrus. It is one of several exotic fruit flies identified as likely to cause significant damage to Australia's horticultural industries. Melon fly would compromise Australia's area-free status with international trading partners, disrupt interstate trade, and add to costs of production.

The closest population of melon fly to Australia is in Papua New Guinea. Stringent quarantine surveillance is being maintained, particularly in northern Australia, through the Northern Australia Quarantine Strategy. Several detections have been made in Torres Strait during the last three years and a single melon fly was trapped in Perth in March 1996. These incidents highlight the urgent need for a formal Contingency Plan for this pest.

Early detection and prompt action would maximise the chances of containment and eradication. This Contingency Plan outlines the responsibilities of state and national authorities and provides details of the action to be taken during the various response phases: detection, alert, containment, and eradication. It also outlines the national system of routine surveillance which exists at the current time (preparedness phase).

The Contingency Plan provides a response framework which is suitable for varying circumstances depending on the nature of a particular incursion. If an incursion is detected early, only a few steps may be required to achieve eradication. On the other hand, a widely-established population may require a full eradication campaign. The Plan is designed to cover a wide range of possibilities, but it is hoped that the enhanced national surveillance effort against exotic fruit flies will ensure early detection of any incursion of melon fly and facilitate the chance of successful eradication.

This Contingency Plan makes no recommendations regarding compensation for losses as a result of an incursion of melon fly. Historically, compensation has not been paid in respect of exotic plant pest and disease incursions in Australia, although consideration of this issue has been signalled as a key priority for the proposed Australian Plant Health Council. It would be premature to propose specific compensation arrangements for melon fly until national agreement is reached between government and industry on compensation principles generally.

Consultation with national stakeholders during development of this Contingency Plan highlighted a number of factors which currently impede Australia's ability to develop effective contingency plans for exotic fruit flies. Further consideration of these factors is beyond the scope of this Contingency Plan, but it is important that they be noted for future attention. These factors are:

**Development and/or refinement of non-morphological diagnostic techniques.** Reviewers of previous drafts of this Contingency Plan strongly promoted the importance of rapid identification of all fruit fly life stages based on genetic rather than morphological characters. This would allow identification of target species in mixed samples of adults as well as identification at the larval stage without recourse to 'breeding out'. For example, larvae of melon fly and the native species, cucumber fly, cannot currently be differentiated from each other using morphological characters. Considerable time savings would result from the availability of such technology, which may give a vital advantage in establishing an early response to a pest incursion.

**Development of accurate day-degree data for fruit fly development.** An important factor in contingency planning is knowledge of fruit fly development times at different temperatures. Such knowledge would allow the establishment of time periods in contingency plans (including suspension times) for different Australian states based on known generation times, rather than an arbitrary period for Australia as a whole, as adopted in this Contingency Plan. It is generally accepted that Australia's international trading partners have more confidence in time periods based on a day-degree model.

**Establishment of treatment protocols for fruit fly host fruit.** This factor should be proactively addressed, in advance of an exotic pest incursion. Stakeholders suggested that a disinfestation research program be initiated on both chemical and physical treatments for fruit fly host fruit, as this is a key issue in maintaining trade during the initial stages of a pest outbreak. Some of this research may be possible 'offshore' in countries where target pests already occur, and such information should be collated as a first step.

**Registration of suitable chemical controls for exotic fruit flies.** In parallel with the previous factor is the need to ensure the availability of suitable chemical control registrations for exotic fruit flies. It is envisaged that negotiations would be needed with the National Registration Authority for Agricultural and Veterinary Chemicals to develop strategies whereby the necessary approvals would either be in place or be activated immediately the need arises.

**Sterile Insect Technology.** The need for national consideration of the strategic advantage of establishing a Sterile Insect Technology (SIT) facility in Australia was noted by several entomologists who reviewed previous drafts of this Contingency Plan. Pointing to the successful use of SIT overseas against fruit flies and other insect pests, these reviewers recommended that the benefit/cost of developing SIT capacity in Australia be urgently investigated.

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## **How to use this Contingency Plan**

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The plan defines the functions (or steps) to be undertaken by both state and national authorities during the 5 strategic phases of a response to a melon fly incursion:

Preparedness,  
Detection,  
Alert,  
Containment, and  
Eradication.

The individual functions (or steps) within each phase are numbered sequentially (Figure 1, next page), and are identified as either :

State functions - either Operational or Management  
or  
National functions- (with the exception of the NAQS surveys, all  
national functions are Management ones).

The functions (steps) are described in detail in the text and are numbered sequentially. For convenience, the response phase is shown at the top of each page. Note that some state and national functions occur concurrently. This is reflected in the structure of Figure 1.

### **To use this document:**

- refer to Figure 1 (next page) for an overview of all 5 phases,
- identify the numbers of the functions (steps) of interest,
- locate details of each function (step) under the numbered headings within each response phase.

### **Appendices**

A diagnostic description of melon fly is given in Appendix 1.

A list of produce that warrants declaration as a melon fly host is given in Appendix 2.

Figure 1. NATIONAL FRUIT FLY CONTINGENCY PLAN FRAMEWORK

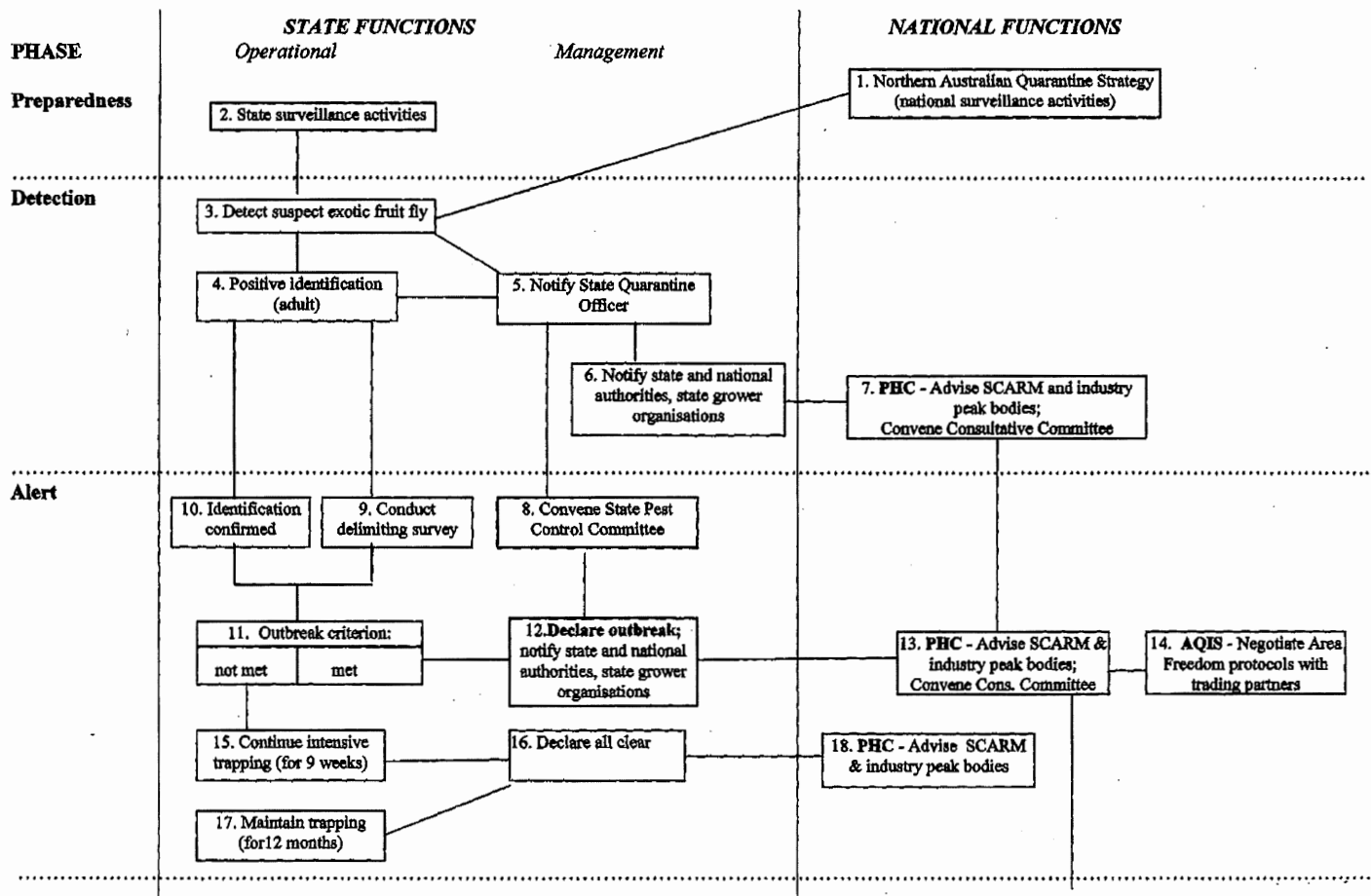




Figure 1. NATIONAL FRUIT FLY CONTINGENCY PLAN FRAMEWORK (continued)

RESPONSE  
STAGE

Containment

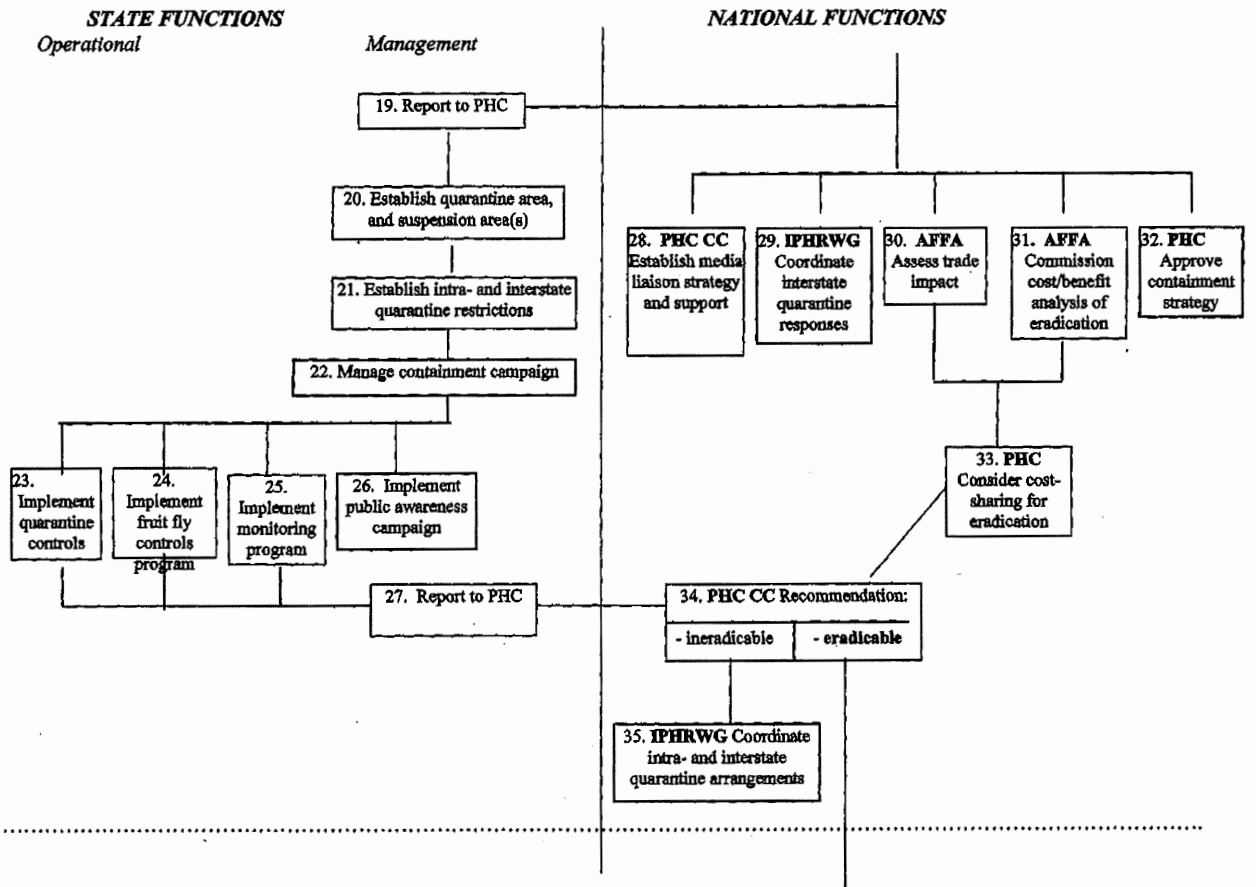
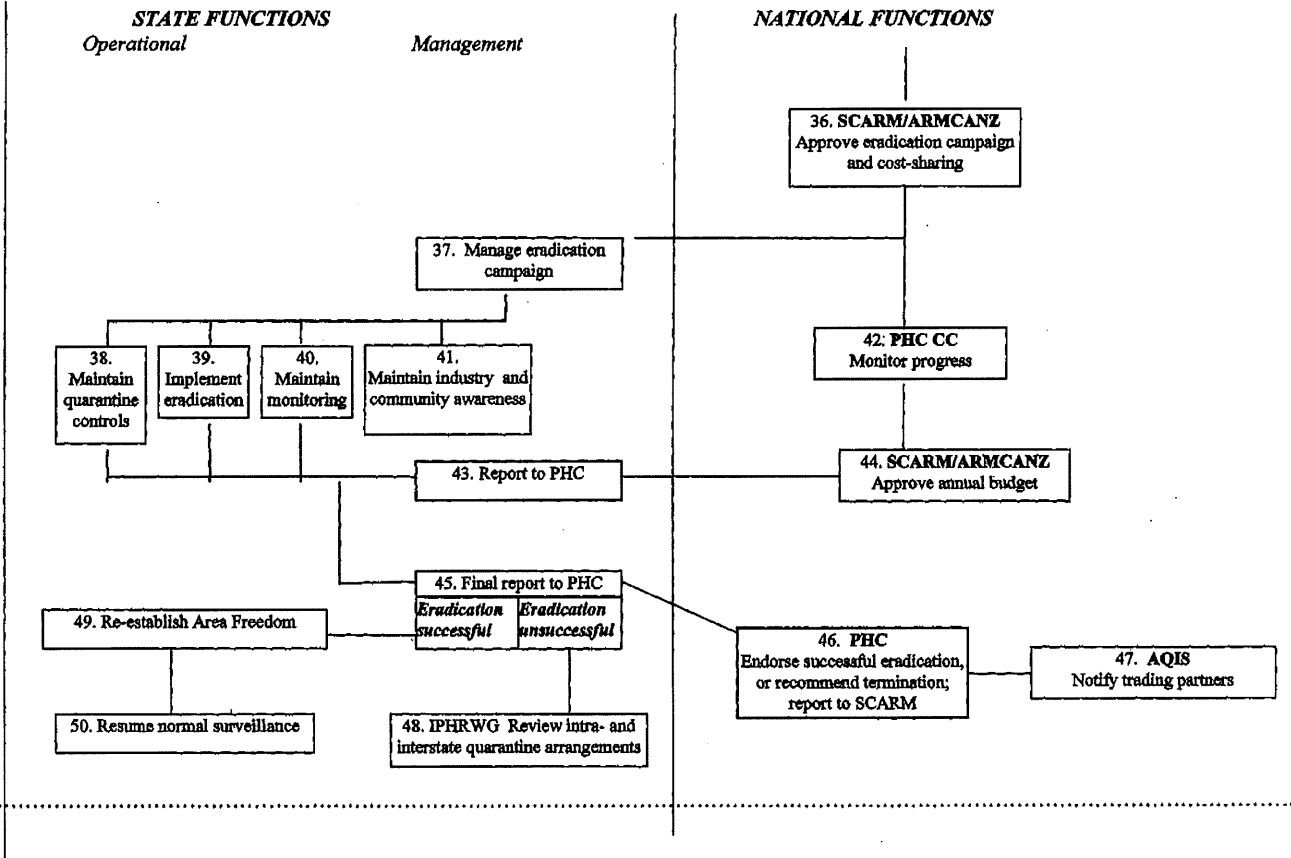


Figure 1. NATIONAL FRUIT FLY CONTINGENCY PLAN FRAMEWORK (continued)

RESPONSE  
STAGE  
  
Eradication



## PREPAREDNESS

*The preparedness phase covers the period of routine surveillance prior to the detection of one or more suspect melon flies.*

*Routine surveillance for melon fly is provided by the cue-lure trapping system maintained by the Northern Australia Quarantine Strategy (NAQS) and by the States through various trapping programs designed to demonstrate area freedom for interstate and overseas markets.*

*The parts of these surveillance activities which are relevant to the response activities described in the rest of this contingency plan - particularly the intensity of trapping and grid sizes - are described below.*

### **STEP 1. Northern Australia Quarantine Strategy (National)**

AQIS, through NAQS,

- undertakes planned surveys of parts of Papua New Guinea and other neighbouring countries under bilateral agreements, as detailed in the NAQS Operational Plan.
- maintains a system of cue-lure traps in coastal areas of northern Australia, from Cairns in Queensland to Broome in Western Australia. Particular emphasis is placed on the Northern Peninsula Area and coastal communities elsewhere on Cape York Peninsula in north Queensland because of proximity to New Guinea.

Cue-lure traps are maintained at:

Northern Peninsula Area: 2 traps at Bamaga, Injinoo, New Mapoon, Seisia and Umagico; 1 trap at Cape York (Pajinka), Lockerbie and Roma Flats.

Coastal communities on Cape York Peninsula: Karumba, Normanton, and Weipa.

- maintains surveillance in Torres Strait as part of a joint AQIS/QDPI program funded jointly by the Commonwealth and States/Territory through cooperative arrangements agreed by SCARM. [This program is independent of, but complementary to, this Contingency Plan. It will be reviewed in July 1999.]

Cue-lure traps are maintained on the following islands:

North-Western Islands:

- three traps on each of Boigu and Saibai; two traps on Dauan.

Eastern Islands:

- three traps on each of Darnley, Murray (Mer) and Yorke;
- two traps on each of Dalrymple and Stephen.

Central and Western Islands: Sub-Group A:

- three traps on each of Badu and Yam;
- two traps on each of Mabuag and Moa.

Central and Western Islands: Sub-Group B:

- two traps on each of Coconut and Warraber (Sue);
- one trap on Tudu;
- one trap on each of Gabba, Deliverance and Nagir (3 monthly clearance only).

Thursday Island group:

## PREPAREDNESS

- six traps on Thursday;
- three traps on Horn.

Traps are cleared fortnightly during the wet season and monthly during the dry season, except as noted above. Trap contents are examined by the NAQS entomologist and results provided to the Animal and Plant Health Service in QDPI, which is the body responsible for response to exotic fruit fly incursions in Queensland.

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### **STEP 2. State surveillance activities**

**(State)**

Three trapping regimes are used by state agencies to demonstrate area freedom from melon fly. The trapping regime is determined by:

- the standards required by interstate or international markets, and
- the existence of cue-lure traps for detection of other fruit flies, particularly Queensland Fruit Fly.

#### **1. Interstate Area Freedom protocol for melon fly**

This is the **minimum** standard proposed for interstate trade. It may be exceeded in areas specifically trapped under the Code of Practice for Management of Queensland Fruit Fly (see 2 below). This minimum standard for interstate Area Freedom in Australia exceeds NASS 158.03.07, the standard required by New Zealand for fruit fly Area Freedom monitoring in a geographically isolated area (see 3 below).

##### **Trap type**

Either Lynfield trap or Steiner trap (in high rainfall areas).

##### **Lure/insecticide type**

Cue-lure plus dichlorvos or maldison. Dose wicks with 4mL of chemical mixture in the ratio 8 parts of lure to 1 part of insecticide (active ingredient).

##### **Trap distribution**

The minimum requirements are:

- a) Major horticultural production areas and associated residential areas:
  - A 5km grid in areas of concentrated production of hosts,
  - Sentinel traps in areas of dispersed production of hosts, and
  - Sentinel traps in high risk locations such as fruit and vegetable markets, rubbish dumps, caravan parks, roadside rest areas and concentrations of unsprayed backyard hosts.
- b) High risk cities, towns and settlements (where overseas visitors may dispose of fruit):
  - A 5km grid in the main urban and port areas of the city or town in which a major international sea or air port is located to provide equivalence to NZ NASS Standard 158.03.07; and
  - Sentinel traps in high risk locations such as fruit and vegetable markets, rubbish dumps, caravan parks, roadside rest areas and concentrations of unsprayed backyard hosts.

##### **Trap positioning**

Hang traps at least 1.5m above ground, out of reach of children and animals, in well-foliated trees but not in the midst of dense foliage that could obstruct fly entry.

The order of priority when selecting sites for positioning traps is as follows:

- a) Host tree with fruit
- b) Host tree without fruit
- c) Large broad leafed tree near a host plant
- d) Large broad-leafed tree.

## PREPAREDNESS

### Trap clearance

The minimum requirement is every fourteen (14) days.

### Trap replacement

Traps should be replaced annually, or sooner if damaged and/or contaminated with cue-lure on the outside of the trap.

### Wick replacement

Lure-insecticide wicks must be replaced at the following minimum frequency:

Tropical areas: 4 weeks; Subtropical: 6 weeks; Temperate: 13 weeks (quarterly).

### Monitoring records

All trap placement, clearance (including negative results) and servicing details are to be recorded and kept on file for auditing purposes.

## 2. Monitoring under the Code of Practice for Management of Queensland Fruit Fly<sup>1</sup>

State Departments of agriculture/primary industries in New South Wales, Victoria, Tasmania, South Australia, Western Australia and the Northern Territory use cue-lure traps in grids to demonstrate that production areas are free from QFF. These traps will also attract melon flies. Within defined production areas, traps are deployed on 400m grids in urban situations, and 1km grids in orchards, with clearance weekly during summer and fortnightly during winter.

## 3. NASS Standard 158.03.07<sup>2</sup>

This standard is in place in all ports-of-entry (capital cities and some provincial centres) in Australia to meet the specifications set by the New Zealand Ministry of Agriculture and Fisheries for fruit fly area freedom monitoring in a geographically isolated area.

NASS Standard 158.03.07 requires that exporting countries, such as Australia, meet the following outcomes:

- definition of the geographically isolated area (whole of Australia in this case)
- placement of Lynfield traps within 2km of ports and airports within the area:
  - 400m grid
  - fortnightly inspection[A 5km grid of the same number of traps within the urban and commercial area surrounding a port or airport is accepted as equivalent, and increases the actual area under surveillance.]
- inspection of suspect cases of fruit flies within the geographic area within 36 hours

<sup>1</sup> SCARM Code of Practice for Management of Queensland Fruit Fly. Interstate Plant Health Regulation Working Group. October 1996.

<sup>2</sup> NASS Standard 158.03.07. Specification for fruit fly area freedom monitoring in a geographically isolated area. National Agricultural Security Service, Ministry of Agriculture and Fisheries, PO Box 2526, Wellington, New Zealand.

## **PREPAREDNESS**

- examination of specimens within 3 working days
- reporting of identifications within 24 hours.

## Response phase - DETECTION

*The detection phase covers the period from collection of a sample suspected of being melon fly through to positive identification and notification of appropriate authorities at state and national levels. The operational and management functions of the state and national bodies are described below.*

### **STEP 3. Detect suspect exotic fruit fly**

**(State)**

The key distinguishing features for melon fly are provided in Appendix 1.

Adult melon flies may be captured in cue-lure traps, or by chance. Larvae may be detected through formal or informal larval surveys, or in specimens submitted by the public. Regardless of source, it is important to advise the appropriate State Fruit Fly Identifying Entomologist nominated below and submit suspect specimens as soon as possible (but within 48 hours).

- QLD - Dr Marlene Elson-Harris, Senior Taxonomic Entomologist, Department of Primary Industries, Entomology Building, 80 Meiers Road, Indooroopilly Qld. 4068. Ph 07 3896 9421; Fax 07 3896 9446.  
Mr John Donaldson, Senior Taxonomic Entomologist, Department of Primary Industries, Entomology Building, 80 Meiers Road, Indooroopilly Qld. 4068. Ph 07 3896 9419; Fax 07 3896 9446.
- NSW - Dr Murray Fletcher, Collection Manager, Agricultural Scientific Collection Unit, NSW Agriculture, Forest Road, Orange, NSW. 2800. Ph: 02 6391 3986; Fax: 02 6391 3899.
- VIC - Dr Malcolm Campbell, Institute Director, Sunraysia Horticultural Centre, cnr 11th Street and Koorlong Ave, Irymple Vic. 3494. Ph 03 5051 4508; Fax 03 5051 4523.  
Dr Mali Malipatil, Senior Taxonomic Entomologist, Institute for Horticultural Development, Private Bag 15, South Eastern Mail Centre, Vic. 3176. Ph 03 9210 9338; Fax: 03 9800 3521.
- TAS - *to be nominated*
- SA - Senior Entomologist, SARDI, Entomology Unit, Waite University, Waite Road, Urrbrae, SA. 5064. Ph 08 8303 9537; Fax: 08 8303 9542.
- WA - Mr A Szito, Curator, Entomology Section, Agriculture WA, Baron-Hay Court, South Perth, WA. 6151.
- NT - *to be nominated*

**Adults are best submitted as dry specimens.**

1. Wrap adult(s) in tissue paper and place in small box or strong tube (glass or plastic), but not so tightly packed as to damage the specimen(s). Dry any wet flies before packing by placing between sheets of absorbent tissue. Transfer to dry tissue before placing in the box or tube.
2. Write the collection details (location, trap ID number (if applicable), date of collection, host etc.) on a sticky label and attach to the outside of the box or tube, with a duplicate label inside.
3. Wrap box or tube in bubble plastic or jiffy bag for added protection.
4. Dispatch by overnight courier (or the most efficient method available) and advise the State Fruit Fly Identifying Entomologist of dispatch.

## Response phase - DETECTION

Larvae of melon fly are unable to be separated on morphological characters from those of the native species cucumber fly, *Bactrocera cucumis* (French). Any larvae in fruit that are suspected of being melon fly should be allowed to breed through to adults. Follow the procedure outlined in Step 9. However, if sufficient larvae are available, between 5 and 20 should be submitted to the State Fruit Fly Identifying Entomologist as hot-water treated specimens, as follows:

1. Wash larvae thoroughly in clean water.
2. Kill larvae by immersion in hot water (just off the boil *ca* 95°C).
3. Allow the water to cool to room temperature.
4. Transfer larvae to 30% ethanol for 30 minutes.
5. Transfer larvae to 50% ethanol for 30 minutes.
6. Preserve larvae in 70% ethanol in a leak-proof tube.
7. Discard excess alcohol before dispatch.
8. Label, dispatch and advise the identifying entomologist as for adult flies.

Steps 4 and 5 may be deleted if time or ethanol is a limiting factor.

Note: Current identification techniques for melon fly rely on adult morphological characters. *Development of the ability to identify melon fly adults and immature stages using non-morphological tests is an issue requiring further consideration.*

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### **STEP 4. Positive Identification (adult)**

**(State)**

#### **Adults:**

Suspect adults should be examined by the State Fruit Fly Identifying Entomologist as soon as possible after receipt. If identified as melon fly, specimens should be forwarded within 24 hours to a national authority for confirmation of identification.

The national authority is to be notified that the specimens have been dispatched.

National authorities:

Dr R A I Drew, Australian School of Environmental Studies, Griffith University, Nathan Campus, NATHAN, QLD, 4111. Telephone (07) 3875 3696; facsimile (07) 3875 3697.

Dr D L Hancock, PO Box 2464, CAIRNS, QLD, 4880. Telephone (07) 4053 4499.

Key references for identification:

1. CABI KEY (1997) - Indo-Australian Dacini (Fruit Flies). I M White and D L Hancock. International Institute of Entomology, London.
2. Drew, R A I (1989). The tropical fruit flies (Diptera:Tephritidae:Dacinae) of the Australasian and Oceanic region. *Memoirs of the Queensland Museum*. Vol 26.
3. White I M and Elson-Harris M M. (1992). Fruit flies of economic significance: their identification and bionomics. CAB International, Wallingford. 601 pp.



## **Response phase - DETECTION**

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The criteria to declare an outbreak (Step 12) are:

- three or more flies are detected within 1.7km in any consecutive 14 day period,
- at least one mated female is located, or
- at least one larva is located in fruit grown at the discovery point.

If fewer than 3 flies are detected, females must be examined for evidence of mating - judged by presence of sperm in the spermatheca. This specialised task involves dissection and staining and will be undertaken by the national authority.

### **Larvae:**

Larvae suspected of being melon fly by a State Fruit Fly Identifying Entomologist may be referred to the national authority. While larvae of melon fly may be distinguished from most native Australian fruit fly larvae using morphological characters, they are indistinguishable from those of cucumber fly, a common native pest of cucurbits.

National authority:

Dr Marlene Elson-Harris, Senior Taxonomic Entomologist, Department of Primary Industries, Entomology Building, 80 Meiers Road, Indooroopilly Qld 4068. Telephone 07 3896 9421; facsimile 07 3896 9446.

Key reference:

White I M and Elson-Harris M M. (1992). Fruit flies of economic significance: their identification and bionomics. CAB International. Wallingford. 601 pp.

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### **STEP 5. Notify State Quarantine Officer**

**(State)**

The State Fruit Fly Identifying Entomologist should notify the State Quarantine Officer within 24 hours when:

- a larval or adult specimen is identified as a suspect melon fly, and
- a larval or adult specimen is positively identified as melon fly.

Current State Quarantine Officers are:

- QLD - Mr Ken Priestly, General Manager, Plant Health, Department of Primary Industries, GPO Box 46, Brisbane Qld. 4001. Ph 07 3239 3361; Fax 07 3239 6994.
- NSW - Mr Doug Hocking, Program Manager (Horticultural Products and Plant Protection), NSW Agriculture, Locked Bag 21, Orange, NSW. 2800. Ph: 02 6391 3150; Fax: 02 6391 3605.
- VIC - Dr Pat Sharkey, Manager (Plant Standards), Institute for Horticultural Development, Private Bag 15, South Eastern Mail Centre, Vic. 3176. Ph 03 9210 9391; Fax: 03 9210 9396.

## **Response phase - DETECTION**

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- TAS - Mr Danny Reardon, Manager (Quarantine and Quality Assurance Branch), Department of Primary Industries and Fisheries, PO Box 347, North Hobart, Tas. 7002. Ph. 03 6233 3518; Fax. 03 6233 3307.
- SA - Mr David Cartwright, Manager Plant Health, Department of Primary Industries & Resources, Swamp Road, Lenswood, SA. 5240. Ph 08 8389 8818; Fax; 08 8389 8899.
- WA - Mr Roland Gwynne, Principal Officer, Quarantine and Inspection service, Agriculture WA, PO Box 1410, Canning Vale, WA. 6155. Ph: 08 9455 5333; fax: 08 9311 3052.
- NT - Mr Ted Fenner, Quarantine and Inspection Branch, Department of Primary Industry and Fisheries, GPO Box 2268, Darwin, NT. 0801. Ph: 08 8941 8516; Fax: 08 8981 0223.

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### **STEP 6. Notify state and national authorities, state grower organisations (State)**

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Within 24 hours of detection of a suspect larval or adult melon fly, the State Quarantine Officer should advise the following authorities of the detection:

- Chief Plant Protection Officer, AFFA,
- Chair, Plant Health Committee (who will notify members),
- Chair, IPHRWG (who will notify members), and
- relevant State grower organisations.

Within 24 hours of positive identification of a specimen as melon fly, the State Quarantine Officer advises the authorities listed above of the confirmation of identification.

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### **STEP 7. PHC - Advise SCARM and Industry peak bodies; convene Consultative Committee (National)**

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When advised that melon fly has been positively identified, PHC liaises with the Chief Plant Protection Officer, DPIE, to:

- advise SCARM and relevant industry peak bodies, and
- convene a Consultative Committee (PHC CC) to oversight implementation of the contingency plan.

Membership of the Consultative Committee will include:

- PHC members representing DPIE/AQIS and relevant state technical authorities,
- the relevant State Quarantine Officers and their nominees,
- relevant technical experts, particularly entomologists, and
- relevant industry representative(s) with observer status.

## **Response phase - ALERT**

*The Alert stage covers state and national functions from the positive identification of at least one melon fly through to declaration of an outbreak.*

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### **STEP 8. Convene State Pest Control Committee (State)**

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The State Quarantine Officer convenes a State Pest Control Committee (SPCC) or equivalent body, which will:

- meet and establish the appropriate state (SPCC) and local (Local Pest Control Centre – LPCC) management structures,
- liaise with appropriate state and local grower organisations, and
- report to state and national authorities on the progress of the delimiting survey and any subsequent developments.

**Notes:**

The SPCC has a strategic role relating to policy development and strategic control of an exotic pest incursion, including budget considerations. Typical composition of an SPCC includes relevant senior managers, technical advisors, a public affairs advisor and an industry representative. SPCC normally operates from departmental headquarters, remote from the outbreak area.

The LPCC is located in the outbreak area. The Local Pest Centre Controller is based there and is responsible for all operations at the local area including staff and assets. The position is supported by relevant scientific and operational staff, arranged in a typical hierarchical structure. The Local Pest Centre Controller is also a member of SPCC to ensure effective communication between the strategic and operational levels of control.

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### **STEP 9. Conduct delimiting survey (State)**

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When one or more flies are identified as melon fly, the following surveillance should be implemented (and continued for at least 9 weeks -- see Step 16):

**Intensified trapping regime:**

***Grid establishment and intensive trapping with Lynfield (or Steiner) traps***

The number of additional traps required depends on the level of trapping which preceded detection (Refer to Steps 1 and 2 under "Preparedness").

*If traps are already on a 400m grid:-*

- a) ensure this pattern extends at least 1.5km from the detection point, by extending the trapping grid if necessary,
- b) place an additional 15 traps within a radius of 200m of the detection point, and

## Response phase - ALERT

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- c) repeat a) and b) for each further detection point until an outbreak criterion has either been met (Step 12), or not met following the intensive trapping period of 9 weeks (Step 15).

*If traps are already on a 1km grid:-*

- a) establish a grid of traps at 400m intervals to at least 1.5km from the detection point,
- b) place an additional 15 traps within 200m of the detection point, and
- c) repeat a) and b) for each further detection point until an outbreak criterion has either been met (Step 12), or not met following the intensive trapping period of 9 weeks (Step 15).

*If traps are already on a 5km grid:-*

- a) establish a grid of traps at 400m intervals to at least 2.5km from the detection point,
- b) place an additional 15 traps within 200m of the detection point, and
- c) repeat a) and b) for each further detection point until an outbreak criterion has either been met (Step 12), or not met following the intensive trapping period of 9 weeks (Step 15).

*If no trapping grid exists:-*

- a) establish a grid of traps at 400m intervals to at least 2.5km from the detection point,
- b) place an additional 15 traps within 200m of the detection point, and
- c) repeat a) and b) for each further detection point until an outbreak criterion has either been met (Step 12), or not met following the intensive trapping period of 9 weeks (Step 15).

*[Note: Use of McPhail traps for female surveillance is not recommended. Recent experience has shown these traps to be labour intensive and largely ineffective because rapid deterioration of trapped insects makes accurate identification impractical. However, the final decision rests with users of this contingency plan.]*

### **Trapping procedure:**

Except where specified in this contingency plan, the operational procedures recommended for routine and intensive trapping are those used by individual states for other fruit flies - PFF, QFF, or Mediterranean Fruit fly (*Ceratitidis capitata* (Wiedemann)).

The relevant Codes, plans and manuals are listed below<sup>3</sup> and cover the following aspects.

- liaison with property owners,
- establishing communication and reporting systems,
- staff training and safety management,
- deployment and maintenance of traps,
- collection of fruit flies,
- identification, and
- withdrawal of traps.

### Larval search:

As part of the delimiting survey, a larval search of all host plants (or as many as practicable) should be conducted within a radius of:-

- 200m of each discovery point if the pre-existing grid was 400m, or
- 500m for broader or no pre-existing grids.

In addition to fruit, the flowers, stems, petioles and young shoots of some hosts (especially cucurbits) may be attacked by melon fly and should also be inspected.

NOTE: The number of larval searches conducted during the extent of the delimiting survey is a decision for SPCC. At least one search should be made, immediately following positive identification of melon fly. The presence/absence of populations of endemic fruit flies and available resources for holding fruit should be considered when deciding on whether further larval searches are warranted.

### *(a) If the detection is in an area where populations of endemic fruit flies are negligible:*

Try to find 100 or more host fruit. Look especially for oviposition scars or visible damage (decay, tissue breakdown) in cucurbits and other preferred hosts.

### *Fruit cutting:*

- Cut one quarter of the number of suspect fruit, looking for larvae (one quarter arbitrarily chosen). If there are no oviposition scars or visible

<sup>3</sup> Fruit Fly Detection and Eradication manual. Primary Industries SA Pest Eradication Unit. September 1997.

SCARM Code of Practice for Management of Queensland Fruit Fly. Interstate Plant Health Regulation Working Group. October 1996.

Papaya Fruit Fly Eradication Program. Monitoring Procedural Manual, Edition 3, July 1998. Department of Primary Industries, PO Box 652, Cairns, Q. 4870.

MA Williams and PW Reid (1994). Fruit fly contingency plan. Dept of Primary Industries and Fisheries, Tasmania.

damage, hold the fruit for 2 days before cutting to allow eggs to hatch or 1st instar larvae to develop.

- **If a larva is located**, treat it as described under Step 3 - Detect suspect exotic fruit fly.

NOTE: Melon fly and cucumber fly are indistinguishable as larvae. However, 5 to 20 preserved larvae will generally be sufficient to distinguish melon fly and the native species, cucumber fly, from other native fruit fly species. Final identification depends on breeding larvae through to the adult stage.

*Breeding adults from suspect fruit:*

Transport the remaining fruit in sealed containers to a quarantine-secure facility and hold until adult emergence.

The conditions under which the fruit should be held are<sup>4</sup>:

- Physical quarantine security and observance of operating procedures sufficient to prevent escape of fruit fly larvae and adults, and
- incubation at temperature of 27°C and relative humidity of 40-70%.

Inspect fruit daily for 14 days; if pupae have not developed by that time, break open the fruit and look for larvae.

More details on procedures for breeding adults are provided in the Papaya Fruit Fly Eradication Program, Monitoring Procedural Manual, Edition 3, July 1998. Queensland Department of Primary Industries.

*Note: This section emphasises the importance of developing a non-morphological test for identifying melon fly in the larval stage.*

***(b) If the detection is in an area where populations of endemic fruit flies are moderate to high:***

In some states, the general activity of other fruit flies (and particularly cucumber fly) is so high that larvae found in fruit are most likely to be those of an endemic fruit fly species rather than melon fly. The State Pest Control Committee may decide that fruit cutting is impractical because of the difficulty of identifying larvae. In such situations, an alternative strategy may be adopted, viz. holding all suspect infested fruit under secure conditions until adults emerge and can be identified.

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**STEP 10. Identification confirmed**

**(State)**

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<sup>4</sup> Source - Action plan for melon fruit fly *Dacus cucurbitae* Coquillett. California Department of Food and Agriculture, Sacramento, California. USA.

## **Response phase - ALERT**

Standard practice is to refer the identified specimen(s) to an independent international authority for confirmation. For melon fly, the nominated taxonomists are:

Dr R A I Drew, Australian School of Environmental Studies, Griffith University, Nathan Campus, Nathan, QLD, 4111. Telephone (07) 3875 3696; facsimile (07) 3875 3697.

Dr Ian White, Department of Entomology, Natural History Museum, Cromwell Road, London, SW7 5BD, United Kingdom.

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### **STEP 11. Outbreak criterion met/not met (State)**

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Trapping continues:-

- until one of the criteria to declare an outbreak has been met (Step 12), or
- for 9 weeks after the latest detection of a confirmed melon fly (Step 15).

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### **STEP 12. Declare outbreak (State)**

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An outbreak must be declared by the State Quarantine Officer when one of the following criteria are met:

- three or more flies are detected within 1.7km in any consecutive 14 day period,
- at least one mated female is located, or
- at least one larva is found in fruit grown at the discovery point. [Note: it is currently not possible to positively identify melon fly larvae.]

Note: Melon flies trapped or found in fruit at a central market are likely to have been transported there in fruit grown elsewhere. Before declaring an outbreak, the State Quarantine Officer will consider whether there is sufficient evidence to indicate that a breeding population exists at that site.

Within 24 hours of reaching an outbreak criterion, the State Quarantine Officer notifies the following authorities:

- Chief Plant Protection Officer, AFFA;
- Chair, Plant Health Committee (who will notify members)
- Chair, IPHRWG (who will notify members).
- relevant State and local grower organisations.

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### **STEP 13. PHC - Advise SCARM and Industry peak bodies; convene Consultative Committee (National)**

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When an outbreak has been declared under one of the criteria listed in Step 12, PHC:

- advises SCARM and industry peak bodies, and

## Response phase - ALERT

---

- convenes a Consultative Committee (PHC CC) to advise it during the outbreak.

Membership of the Consultative Committee will include:

- PHC members representing AFFA and relevant state technical authorities,
- the relevant State Quarantine Officers and their nominees,
- relevant technical experts, particularly entomologists, and
- relevant industry representative(s) with observer status.

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### **STEP 14. AQIS - Negotiate Area Freedom protocols with trading partners (National)**

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When an outbreak has been declared under one of the criteria listed in Step 12, AQIS

- notifies Australia's international trading partners of a declared outbreak, and
- negotiates with such trading partners on the trapping protocols and other conditions required to obtain acceptance of Area Freedom outside the quarantine area.

Note: In the Containment phase, AQIS negotiations are continued to reach agreement with trading partners on market access protocols (Step 30).

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### **STEP 15. Continue intensive trapping (State)**

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As indicated under Step 11, trapping continues for 9 weeks after the latest detection of a confirmed melon fly. [If continued trapping results in an outbreak criterion being met, a response would be implemented as per Step 12.]

NOTE: In the absence of accurate day/degree data for development of melon fly in Australia, a period of 9 weeks is suggested as a suitable length of time to maintain surveillance to support a decision for outbreak or all clear. This should allow at least one generation of melon fly, plus a safety margin. *Refinement of this figure is identified as an issue needing future attention.*

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### **STEP 16. Declare all clear (State)**

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An all-clear will be declared when a delimiting survey (see Step 9 - Conduct delimiting survey) has been conducted for a minimum of 9 weeks since the latest detection of a confirmed melon fly and an outbreak criterion has not been met.

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### **STEP 17. Maintain trapping (State)**

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## **Response phase - ALERT**

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When no adult melon fly or larva has been detected for a period of 9 weeks and the all-clear has been given by the State Pest Control Committee, intensive surveillance will continue for a period of 12 months, using a 1km grid within a 3km radius of the detection point.

NOTE: If continued trapping results in an outbreak criterion being met, a response would be implemented as per Step 12.

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### **STEP 18. PHC - Advise SCARM and industry peak bodies (National)**

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When the all-clear has been declared under the conditions listed in Step 16, PHC advises SCARM and industry peak bodies.

## **Response phase - CONTAINMENT**

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*The containment phase covers (concurrent) state and national functions from the declaration of an outbreak to the decision on whether or not the outbreak is eradicable.*

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### **STEP 19. Report to PHC**

**(State)**

As soon as practicable, the State Quarantine Officer provides a detailed report to PHC, summarising the known information about a declared outbreak, including:

- identification,
- number, location, date of detection- indicated on a map of the area (e.g. using street names in urban areas or GPS coordinates in rural areas),
- for trap catches - trapping history, trap and lure type, trapping grids before and after the identification,
- for larvae reared through to adults, species and ripeness of host, source of fruit,
- possible pathways of entry,
- host plants in the area, and their fruiting status,
- movements of host fruits - commercial and non-commercial - into and out of the area,
- fruit fly controls used in the area,
- description of the area - agricultural activities, terrain, conserved areas, size and structure of the local community, and
- an opinion on the appropriate containment and eradication options described under Step 39.

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### **STEP 20. Establish Quarantine Area and Suspension Area(s)**

**(State)**

A quarantine area is established under State legislation taking into account the known extent of the outbreak, natural geographic barriers such as oceans and mountain ranges, distribution of host plants, and opportunities for controlling the movement of produce to other parts of the State or other States.

The area should be sufficiently large to accommodate the suspension area(s) required by a likely additional detection (or detections).

Suspension areas (in which Area Freedom for melon fly is suspended) are established under State legislation as follows:

- 15km radius from the outbreak centre, if the greatest distance between detection points is 1.7km or less
- 30km radius from the outbreak centre, if the greatest distance between detection points is more than 1.7km.

## **Response phase - CONTAINMENT**

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### **The State Quarantine Officer notifies**

- Chief Plant Protection Officer, AFFA,
- Chair, Plant Health Committee,
- Chair, IPHRWG, and
- relevant State and local grower organisations

of the boundaries of:

- the quarantine area established to control the movement of declared hosts, and
- the suspension area(s) established on the basis of confirmed outbreak(s) of melon fly.

Note: Melon flies trapped or found in fruit at a central market are likely to have been transported there in fruit grown elsewhere. Before declaring an outbreak, the State Quarantine Officer will consider whether there is sufficient evidence to indicate that a breeding population exists at that site. Therefore, security restrictions should apply to central markets only if the outbreak centre is within 5km of the market.

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### **STEP 21. Establish Intra- and interstate quarantine restrictions**

**(State)**

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In each state that considers quarantine to be necessary, the State Quarantine Officer establishes, in consultation with IPHRWG and AQIS, harmonised quarantine restrictions to prevent the spread of melon fly intra- and interstate.

#### **Declared host produce and commodities include:**

- The specific parts of those plant species listed as declared produce in Appendix 2, and future additions to this list approved by IPHRWG on the basis of information available, and
- Any other product, article or means of conveyance which is determined by IPHRWG to be a likely means of melon fly spread.

#### **Movement restrictions include:**

- The movement from the quarantine area of declared host produce grown or packed within suspension areas is prohibited, unless certified as treated in an approved manner or in an approved condition (see below),
- The movement from the quarantine area of declared host produce grown outside, but moved into or through a suspension area, is prohibited unless it has been secured against infestation while in a suspension area, as follows:

## **Response phase - CONTAINMENT**

in an enclosed vehicle such as a pantehnicon or tautliner, provided the doors are closed and there are no holes in the cover, or

in a non-enclosed vehicle such as a flat top, provided the produce is in a secure container (normally lidded container with unscreened vent holes, bulk bin with a fly proof cover, or closed shipping container) or the load is covered by a tarpaulin, mesh or other fly-proof cover with a maximum aperture of 1.6 mm.

*[Explanatory note: The issue of unscreened vs screened vent holes in lidded containers has been given serious consideration in developing this contingency plan. It was concluded that unscreened holes provide sufficient security against the risk of infestation of declared produce during uninterrupted transit of a suspension area. Imposing a requirement that vent holes be screened would be highly disruptive to trade and cannot be justified.]*

### **Approved treatments for fruit and vegetables**

#### *Notes:*

*The treatments listed below are based on those used for other fruit flies. A NRA permit may be needed before they can be recommended for the control of melon fly. Some fruits may be damaged by the following treatments; before using them, checking with experienced operators such as licensed fumigators or agricultural officers for any available information is recommended. Testing of small quantities of fruit for damage is also recommended prior to large-scale treatment.*

*An Agvet Code registered product containing the chemicals mentioned must be used and the first aid, safety, protection, storage and disposal directions on the product label must be followed. Treatment facilities must comply with the requirements of the relevant local government, environmental and workplace health and safety authorities. Following these treatments does not absolve users from the responsibility of ensuring that treated fruit does not contain a pesticide residue above the Maximum Residue Limit (MRL).*

*Appendix 6 of the Code of Practice for Management of Queensland Fruit Fly (IPHRWG report) should also be consulted.*

#### **(a) Dimethoate Dipping (All fruits except mango, peach, strawberry, capsicum and defective flower end-type papaw)**

Fruit is fully immersed in a mixture containing 400mg/L dimethoate for a period of not less than sixty seconds.

Dipping with dimethoate must be the last treatment before packing, except that a non-recovery gloss coating ("wax") may be applied to citrus not less than sixty seconds after treatment.

## **Response phase - CONTAINMENT**

At the time of treatment, papaws must be hard and must have not more than 25% of their ripe colouration when assessed over their entire surface area.

Carambola, longan, lychee, passionfruit, star apple and rambutan may be dipped for ten seconds, after which the fruit must remain wet for a period of not less than sixty seconds.

### **(b) Dimethoate Dipping (Peach, nectarine and plum only)**

The fruit is dipped in a mixture containing 200 mg/L dimethoate for a period of not less than sixty seconds.

Dipping with dimethoate must be the last treatment before packing.

The fruit must not have been sprayed with dimethoate before harvest.

### **(c) Fenthion Dipping (All fruits classified as "Tropical and Subtropical Fruits with Inedible Peel and Fruiting Vegetables (including Cucurbits) except Capsicum" in the registered label for Lebaycid<sup>®</sup>, except mango and defective flower end-type papaw)**

The fruit is fully immersed in a mixture containing 412.5mg/L fenthion for a period of not less than sixty seconds. Dipping with fenthion must be the last treatment before packing.

At the time of treatment, papaws must be hard and must have not more than 25% of their ripe colouration when assessed over their entire surface area.

Longan, lychee, passionfruit and rambutan may be dipped for ten seconds, after which the fruit must remain wet for a period of not less than sixty seconds.

### **(d) Dimethoate Flood Spraying (All fruits except mango, peach, strawberry and defective flower end-type papaw)**

The fruit is flood sprayed in a single layer with a mixture containing 400mg/L dimethoate in a high volume application of at least 16 L/min per each square metre of the area being flood sprayed, which provides complete coverage of the fruit for a minimum of ten seconds, after which the fruit must remain wet for not less than sixty seconds.

Flood spraying with dimethoate must be the last treatment before packing, except that a non-recovery gloss coating ("wax") may be applied to citrus not less than sixty seconds after treatment.

At the time of treatment, papaws must be hard and must have not more than 25% of their ripe colouration when assessed over their entire surface area.

## Response phase - CONTAINMENT

(e) *Fenthion Flood Spraying (Capsicum and all fruits classified as "Tropical and Subtropical Fruits with Inedible Peel and Fruiting Vegetables (including Cucurbits)" in the registered label for Lebaycid<sup>®</sup>, except mango and defective flower end-type papaw)*

The fruit is flood sprayed in a single layer with a mixture containing 412.5mg/L fenthion, in a high volume application of at least 16 L/min per each square metre of the area being flood sprayed, which provides complete coverage of the fruit for a minimum of ten seconds, after which the fruit must remain wet for not less than sixty seconds. Flood spraying with fenthion must be the last treatment before packing.

At the time of treatment, papaws must be hard and must have not more than 25% of their ripe colouration when assessed over their entire surface area.

(f) *Fenthion Non-recirculating Spraying (Avocado and mango only)*

The fruit is sprayed in a single layer in a non-recirculating system with a mixture containing 412.5 mg/L fenthion, in a low volume application of at least 0.6 L/min for avocado and 1.2 L/min for mango per each square metre of the area being sprayed, which provides complete coverage of the fruit for a minimum of ten seconds, after which the fruit must remain wet for not less than sixty seconds. Non-recirculating spraying must be the last treatment before packing.

(g) *Methyl Bromide Fumigation (All fruits)*

The fruit is fumigated with methyl bromide in a gas tight chamber that has been approved by a government officer in the past six months as being capable of sustaining treatments at the required rate throughout the required period.

The fruit is fumigated with methyl bromide at 32 g/m<sup>3</sup> for two hours at a fruit temperature of 21 to 25.9°C or equivalent dosage as follows:

Methyl Bromide (g/m <sup>3</sup> )	Flesh Temp (degrees C)	Time (hours)
24	26-31.9	2
32	21-25.9	2
40	15-20.9	2
48	10-14.9	2

The volume of the load within the chamber must not be less than thirty percent nor greater than fifty percent of the volume of the chamber when empty.

A fan or fans shall be used to ensure dispersion of the gas throughout the chamber during the fumigation period.

## **Response phase - CONTAINMENT**

At the time of packing, a papaw must be hard and must have not more than 25% of its ripe colouration when assessed over its entire surface area.

Note 1: The fumigation must be conducted by a licensed operator and the fumigation facility must have approval to operate from the relevant authorities.

Note 2: Defective flower end-type papaws fumigated with methyl bromide and packed in an 18 litre half papaw package must be marked on one end with the words SOLO TYPE or the cultivar name such as SOLO or KAPOHO. Fruit exceeding 200 mm in length may be packed in a larger 30 litre carton provided the required words on the type or cultivar are marked on both ends of the package.

A defective flower end-type papaw is a fruit from a plant of the Solo family of cultivars, or from a plant that contains significant Solo parentage, or from a plant that is hermaphrodite, or from any cultivar that has a tendency to produce fruit with an invaginated flower end.

### **(h) *Heat Treatment (Mango and papaw only)***

Mango fruit is treated in an approved vapour heat or hot water treatment facility at 46.5°C for twenty minutes or 47°C for fifteen minutes.

Papaw fruit is treated in an approved high temperature forced air facility for a period of not less than three and a half hours and until the seed cavity temperature reaches 47.2° C as monitored in the heaviest fruit in each batch. A fruit may be immediately hydrocooled after treatment. A fruit must not be soft, over-ripe or exhibiting damage or decay.

### **(i) *A System of Pre-harvest Treatment, Post-harvest Treatment, and Post-harvest Inspection (Mango only)***

The fruit is treated under an Interstate Certification Assurance arrangement to comply with the following three requirements.

#### **1. Pre-harvest treatment which means cover sprayed with a mixture containing -**

(i) 75 mL of a concentrate containing 550 g/L fenthion per 100 L of spray mixture; or

(ii) 75 mL of a concentrate containing 400 g/L dimethoate per 100 litres of spray mixture;

every two weeks from six weeks prior to harvest to time of harvest.

2. Post-harvest treatment which means post-harvest treated with either treatment method (a), (c), (d), (e) or (f) in this Schedule.

3. Post-harvest inspection which means from a lot that was inspected after harvest, and found free of live fruit fly infestation.

## Response phase - CONTAINMENT

All treatments, inspections and other activities that are part of this system are carried out as detailed in the Interstate Certification Assurance procedure that describes this treatment system.

### *(j) A System of Property Freedom Monitoring, Pre-harvest Treatment, and Post-harvest Inspection (Grape, lychee, and ground-grown strawberry only)*

The fruit is treated under an Interstate Certification Assurance arrangement to comply with the following three requirements.

1. Property freedom which means that the property on which the fruit is grown and the surrounding area are monitored by trapping and no papaya fruit fly are detected within 15 km of the property within twelve weeks of harvest.
2. Pre-harvest treatment which means that all plants growing the species of fruit on the property are treated for fruit fly every two weeks from six weeks prior to harvest (two weeks prior to harvest for strawberry) with an approved fruit fly bait treatment (lychee and grape only) or an approved fruit fly cover spray treatment (grape and strawberry only).
3. Post-harvest inspection which means from a lot that was inspected after harvest to ensure that it is
  - (i) free of broken skin (lychee and grape only), or
  - (ii) free of live fruit fly infestation (strawberry only).

All treatments, inspections and other activities that are part of this system must be carried out as detailed in the Interstate Certification Assurance procedure that describes this treatment system.

### **Fruit in an approved condition**

*[Explanatory note - all citrus and Passiflora species are listed as hosts in Appendix 2. Some citrus hosts e.g. lemon may be declared non-hosts if unripe or immature, and some passionfruit may be non-hosts if hard-shelled. These are matters for which simple scientific experiments will be necessary to provide data on which the IPHRWG may reach a decision on host status and the need to regulate movement or not.]*

#### **(a) Banana - Hard Green, Unbroken Skin, Cavendish type**

Fruit of banana (*Musa* spp.) that comply with the following three conditions.

1. Hard green which means -
  - (i) the flesh is hard and not flexible, the skin is green and shows no yellow colouration except for an area towards the flower end of a fruit in which the sun has bleached the skin to a yellow to white colour but the flesh beneath is still hard; and



## **Response phase - CONTAINMENT**

(ii) no single banana, or banana on the outside whorl of a hand or cluster (except a wing banana or distorted banana) has a diameter that exceeds 42 mm when measured at right angles to the curvature of the fruit at a point one third from its flower end.

2. Unbroken skin which means the skin has no pre-harvest crack, split, puncture or other break that penetrates through to the flesh.

3. Cavendish type which means a banana belonging to the Cavendish subgroup of the AAA genome and includes but is not limited to the cultivars Williams, Mons Mari, Grande Naine, Dwarf Cavendish, WR1, J D Dwarf and J D Special.

### **(b) *Durian - Unbroken Skin***

Fruit of durian (*Durio zibethinus*) with unbroken skin which means the skin has no pre-harvest crack, split, puncture or other break in the skin that penetrates through to the flesh.

### **(c) *Longan - Approved Cultivar, Unbroken Skin***

Fruit of longan (*Euphoria longan*) that complies with the following two conditions.

1. Approved cultivar which means the cultivars Biew Kiew, Fukhoa and Iao.
2. Unbroken skin which means that the fruit has no sting, crack, puncture or other break that penetrates through to the flesh and has not healed with callus tissue.

### **(d) *Lychee - Approved Cultivar, Unbroken Skin***

Fruit of lychee (*Litchi chinensis*) that complies with the following two conditions.

1. Approved cultivar which means the cultivar Kwai May Pink.
2. Unbroken skin which means that the fruit has no sting, split, pulled stem or other break that penetrates through to the flesh, and has not healed with callus tissue.

### **(e) *Mangosteen - Unbroken Skin***

Fruit of mangosteen (*Garcinia mangostana*) with unbroken skin which means that the skin has no pre-harvest sting, crack, puncture or other break that penetrates to the pith of the shell and has not healed with callus tissue.

## Response phase - CONTAINMENT

(f) *Pumpkin - Approved Cultivar, Unbroken Skin*

Pumpkin and gramma fruit that comply with the following two conditions.

1. Approved cultivar which means a cultivar -
  - (i) of the species *Cucurbita moschata* including the cultivars Bugle and Jap; or
  - (ii) of the species *Cucurbita maxima* including the cultivars Queensland Blue, Sweet Grey and W A Grey but not cultivars of the Delica (Japanese hybrid squash) type.
2. Unbroken skin which means-
  - (i) the skin has no pre-harvest crack, split, puncture or other break that penetrates through to the flesh, and has not healed with callus tissue; and
  - (ii) the fruit has no soft rot; and
  - (iii) the stem is dry, intact and short.

(g) *Rambutan - Approved Cultivar, Unbroken Skin, Not over-ripe*

Fruit of rambutan (*Nephelium lappaceum*) that complies with the following three conditions.

1. Approved cultivar which means a red-type cultivar.
2. Unbroken skin which means the skin has no pre-harvest crack, split, puncture or other break that penetrates through to the flesh, and has not healed with callus tissue.
3. Not over-ripe which means free of all the following symptoms-
  - (i) the skin has a dull appearance and a lack of lustre;
  - (ii) the skin is a dark maroon colour;
  - (iii) the flesh is not firm and not translucent;
  - (iv) the flesh has a winy and over-ripe taste.

(h) *Tahitian Lime - Unbroken Skin, No Yellow Colour*

Fruit of Tahitian lime (*Citrus latifolia*) that complies with the following two conditions.

## **Response phase - CONTAINMENT**

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1. Unbroken skin which means that the skin has no pre-harvest sting, crack, puncture or other break that penetrates to the pith of the rind, and has not healed with callus tissue.
2. No yellow colour which means that the skin has the green colour of unripe fruit with no yellowing.

(i) *Watermelon - Unbroken Skin*

Fruit of watermelon (*Citrullus lanatus* var. *caffer*) with unbroken skin, which means that the following conditions are met.

1. The skin has no pre-harvest crack, split, puncture or other break that penetrates through to the white or red flesh, and has not healed with callus tissue, and
2. The fruit has no soft rot.

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**STEP 22. Manage containment campaign**

**(State)**

Procedures agreed by PHC for containment of melon fly while the feasibility of eradication is being considered are coordinated by the State Pest Control Committee and implemented through the Local Pest Control Centre.

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**STEP 23. Implement quarantine controls**

**(State)**

The State Quarantine Officer is responsible for:

- Establishing ways in which declared host produce and commodities are permitted to move from and through the quarantine area, including:
  - \* produce transported to market by road, rail, sea or air ,
  - \* produce sold in local shops and markets,
  - \* produce carried by travellers, and
  - \* other items including soil, potting mix and potted plants.
- Establishing check points on key exit roads from the area, at airports, and at bus and railway stations and seaports, as appropriate.
- Establishing procedures for ensuring that declared host produce has been treated or is in an appropriate condition to meet a protocol (Step 21) before it is allowed to leave the quarantine area.

## **Response phase - CONTAINMENT**

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- Establishing a publicity campaign to enlist the assistance of the public moving produce by road, rail, sea or air (Step 26).

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### **STEP 24. Implement fruit fly controls**

**(State)**

At this stage, the primary purpose of implementing fruit fly controls is to contain the outbreak until enough information becomes available to decide whether or not eradication is feasible. The options listed below are described in Step 39.

- male annihilation,
- bait application,
- cover spraying,
- soil treatment, and
- hygiene and fruit stripping.

Since the male melon fly is known to respond to cue-lure, male annihilation in combination with spot leaf treatment (protein bait application) is indicated as the most likely eradication strategy in most situations.

Melon fly, especially males, may seek refuge in the foliage of trees near low-growing cucurbit crops. This should be taken into account in applying control treatments.

Although melon fly responds to cue-lure, the level of attraction is lower than, for example, that of methyl eugenol (ME) for PFF. For this reason, the possibility of needing to use Sterile Insect Technology (SIT) should be considered as early as possible in the control program.

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### **STEP 25. Implement monitoring program**

**(State)**

Monitoring is an essential component of the containment program and is used

- to continue to define the area of infestation,
- to detect breeding 'hot spots',
- to identify additional hosts that warrant declaration, and
- to assess the effectiveness of the control program.

Monitoring involves both trapping and fruit collecting.

The trapping intensity is maintained at the level described for the delimiting survey (see Step 9) for the duration of the containment period if this is logistically possible. If the area is large and a high trapping intensity cannot be maintained, a trapping grid

## **Response phase - CONTAINMENT**

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(1.0km) should be deployed around the margin of the quarantine area to detect any expansion of the infested area.

**Fruit sampling.** The procedures for collecting fruit and holding for emergence of adults are as described in Step 9.

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### **STEP 26. Implement public awareness campaign (State)**

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The State Quarantine Officer will ensure that there is an adequate flow of information to affected growers, property owners, travellers and the general public at the local level, using means which may include:

- media coverage,
- letterbox drop,
- leaflets for travellers,
- newsletter with updates on progress,
- toll-free 'hot line',
- public meetings, and
- meetings with local grower groups.

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### **STEP 27. Report to PHC (State)**

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The State Quarantine Officer issues regular progress reports and special reports as required e.g. when significant events occur. These reports update (as appropriate) information under the headings listed under Step 19, as well as advising on:

- effectiveness of mechanisms for controlling movement of declared produce and other quarantinable items,
- progress in monitoring and implementation of containment procedures, and
- any other information on the outbreak needed to assess the chances of successful eradication.

*THE FOLLOWING NATIONAL FUNCTIONS OCCUR CONCURRENTLY WITH THE STATE CONTAINMENT FUNCTIONS (STEPS 19 -27 - see Figure 1)*

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### **STEP 28. PHC CC - Establish media liaison strategy and support (National)**

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To ensure that an accurate, up-to-date and consistent message is presented to the public through the media at the national level, PHC CC:

## **Response phase - CONTAINMENT**

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- asks AFFA, state departments and industry organisations to identify those persons who will be interacting with the news media, and
- arranges a mechanism for ensuring that these media contacts are:
  - \* provided with current technical information on melon fly,
  - \* kept informed of the progress of the campaign, and
  - \* aware of policy decisions and positions adopted by PHC and other stakeholders.

Strategies may include:

- establishing a communications office,
- daily (or regular) briefings for media contacts, and
- joint media releases and briefing sessions.

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### **STEP 29. IPHRWG - Coordinate interstate quarantine responses** **(National)**

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The Interstate Plant Health Regulation Working Group coordinates and harmonises quarantine responses by each State/Territory to the outbreak.

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### **STEP 30. AFFA - Assess trade impact** **(National)**

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AQIS:

- negotiates with regulatory authorities of Australia's international trading partners on quarantine and market access conditions during the outbreak.

Plant Protection Branch:

- assesses the impact on international trade, and
- advises the states and industry organisations on trade implications.

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### **STEP 31. AFFA - Commission cost/benefit analysis of eradication** **(National)**

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If needed, AFFA commissions ABARE or another service provider to establish the costs and benefits to Australia of eradication of melon fly.

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### **STEP 32. PHC CC - Approve containment strategy** **(National)**

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PHC CC considers the feasibility of eradication and approves the strategy to be used to contain the outbreak while eradication is being considered.

## **Response phase - CONTAINMENT**

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### ***STEP 33. PHC CC - Consider cost-sharing for eradication (National)***

PHC CC recommends to PHC any arrangements for sharing costs between the Commonwealth and States/Territory.

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### ***STEP 34. PHC recommendation (National)***

PHC considers all available scientific information and advises SCARM on the technical feasibility of eradication, recommending an appropriate strategy and proposing cost-sharing arrangements, based on information provided by PHC CC.

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### ***STEP 35. IPHRWG - Coordinate Intra- and interstate quarantine arrangements (National)***

If PHC concludes that the outbreak cannot be eradicated, the affected state(s) must decide whether or not to continue quarantine restrictions within the state. The issue of quarantines within and between states is referred to IPHRWG. If quarantines are maintained, the pest assumes the status of "quarantinable" - ie present, but under active control.

## **Response phase - ERADICATION**

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*The eradication stage describes state and national functions from the point an eradication campaign is approved through to completion of the campaign.*

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### **STEP 36. SCARM/ARMCANZ - Approve eradication campaign and cost-sharing** **(National)**

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SCARM/ARMCANZ will consider the recommendation from PHC to eradicate, and if approved, will endorse cost-sharing arrangements.

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### **STEP 37. Manage eradication campaign** **(State)**

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If SCARM/ARMCANZ approves eradication and cost-sharing arrangements, the State Quarantine Officer manages the campaign.

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### **STEP 38. Maintain quarantine controls** **(State)**

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The procedures established under Step 23 are maintained during the eradication campaign.

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### **STEP 39. Implement eradication** **(State)**

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This section is an extension of the operational activities in the containment phase.

Decisions on the preferred treatments for eradication will be made by PHC CC after considering the extent of the outbreak, and other factors such as environmental sensitivities, population density and the topography/land use pattern in the outbreak area e.g. agricultural or urban. The eradication options for melon fly are:

- Male annihilation,
- Protein bait application,
- Cover spraying,
- Soil treatment,
- Hygiene and fruit stripping, and
- Sterile Insect Technology.

Since the male melon fly is known to respond to cue-lure, male annihilation in combination with spot leaf treatment (protein bait spraying) is indicated as the most likely strategy in most situations.

Melon flies, especially males, may seek refuge in trees near low-growing cucurbit crops. This should be taken into account in applying control treatments.



## Response phase - ERADICATION

Although melon fly responds to cue-lure, the level of attraction is lower than, for example, that of methyl eugenol (ME) for papaya fruit fly. For this reason, the possibility of needing to use the Sterile Insect Technology (SIT) should be considered as early as possible in the control program.

### 1. Male annihilation (aerial or ground):

Male annihilation is the primary eradication measure. It involves the use of cue-lure in combination with an insecticide (e.g. maldison) to attract and kill male melon flies. [A 1:1 ratio of 2mL maldison (Hy-mal, 1150g/L) and 2mL of cue-lure per block was used in the campaign to eradicate QFF in Perth in 1992.]

The mixture may be:

- **impregnated into caneite blocks which are attached from the ground to trees or other objects.**<sup>5</sup>

**Advantages** Blocks may be accurately deployed, out of reach of children and pets. They can be replaced readily, and can be recovered. Block removal is essential for meeting protocols to demonstrate Area Freedom. It also allows removal of residual insecticide, which is important in sensitive situations such as national parks and urban areas. Blocks may be enclosed in modified plastic milk containers if affected insects need to be contained or to prevent the possibility of insecticidal contamination of the environment.

**Disadvantages** Blocking is time consuming and requires reasonable access to the target area. It also requires maintenance of detailed records of block placement to facilitate recovery of spent blocks.

**Operational details** Refer to Eradication Procedural Manual, Papaya Fruit Fly Eradication Program. QDPI. Edition 3, July 1998. [Although a different lure is used, the operational details are applicable to other fruit flies.]

- **impregnated into caneite blocks which are tied in pairs and deployed from the air to catch in trees and vegetation.** [*Note - Cordelitos distributed from a helicopter were used effectively in remote areas in Torres Strait for control of PFF in 1993 - in association with Steiner traps (with maldison) in villages. However, preliminary testing by DPI has shown that tied blocks are a more practical method, should aerial male annihilation be required in the future.*]

**Advantages** May be deployed efficiently over large areas or difficult terrain.

**Disadvantages** Placement is less accurate, and the technique is unsuitable for built-up areas. Tied blocks cannot be retrieved.

**Operational details** The Final Report on Eradication of Oriental Fruit Flies (*B. dorsalis* complex species) from the Torres Strait Islands (QDPI internal report) provides guidance.

In California, USA, the thickening agent Min-U-Gel is used as a carrier for ME and the insecticide naled for eradication of Oriental fruit fly. It is deployed by squirting a

<sup>5</sup> based on Papaya Fruit Fly Eradication Program, *Eradication Procedural Manual, Edition 3, July 1998*. Department of Primary Industries, PO Box 652, Cairns, Q. 4870.

## Response phase - ERADICATION

defined dose onto vertical surfaces such as tree trunks, telephone poles, concrete walls etc.<sup>6</sup> Due to its disadvantages, this technique is not recommended in Australia.

**Advantages** Easy to apply. Less labour and time to prepare than blocks. Very effective in urban areas (ease of distribution along roads).

**Disadvantages** Burns foliage, corrodes metal, and must be re-applied fortnightly; cannot be recovered. Longevity under high rainfall conditions is unknown.

**Operational details** Refer to Action Plan for Melon Fruit fly. California Department of Food and Agriculture. Revised March 1989. Addendum C1.

NOTE: Min-U-Gel is a viscous colloidal-grade clay (Fullers earth). Attagel (Rhone-Poulenc Rural) is the Australian equivalent of Min-U-Gel, but naled is not registered here and therefore unavailable.

### 2. Protein bait application - ground or aerial:

Protein bait spraying complements male annihilation and both strategies would normally be used in conjunction, particularly in known breeding sites. Note: bait sprays combine a protein source (yeast autolysate) used as a bait to attract both male and female fruit flies, with an insecticide such as maldison which kills the attracted flies. Treatments may require NRA approval before use.

**Ground application.** A small volume (100mL) of bait formulation is squirted onto patches of foliage of host trees (where available) using manually operated or powered equipment. Manually operated equipment is indicated in suburban situations where small quantities are to be dispensed in densely populated areas.

The rates of application of yeast autolysate and maldison and the techniques used are the same for all fruit flies. Operational details are provided in the following publications:

- Papaya Fruit Fly Eradication Program - Eradication Procedural Manual, Edition 3, July 1998. QDPI.
- Integrated Chemical and Sterile Fruit Fly Release Eradication Procedure Manual. Primary Industries South Australia, Pest Eradication Unit. April 1993.
- Fruit fly detection and eradication manual. Primary Industries South Australia, Pest Eradication Unit. September 1997.
- Fruit fly contingency plan - Riverland. Primary Industries South Australia, Pest Eradication Unit. October 1997.
- SCARM Code of Practice for Management of Queensland Fruit Fly. Interstate Plant Health Regulation Working Group. October 1996.

**Aerial application.**<sup>7</sup> Protein bait sprays may also be applied from the air where large areas of accessible crops are to be treated.

<sup>6</sup> source - Action plan for melon fruitfly *Dacus cucurbitae* Coquillett. California Dept of Food and Agriculture, Revised March 1989.

## **Response phase - ERADICATION**

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<sup>7</sup> For further information on aerial application, refer to Action plan for melon fruitfly *Dacus cucurbitae* Coquillett. California Department of Food and Agriculture. Revised March 1989. Addendum C1.

## Response phase - ERADICATION

### 3. Cover spraying - (aerial and ground):

Note. Cover spraying has the advantage of controlling eggs and larvae as well as adults. It is the treatment most likely to affect non-target organisms and environments, and care needs to be taken with stock, pets and waterways. However it is an option when insecticidal spraying is compatible with agricultural practice e.g. some large-scale or intensively managed horticultural situations. It is not suitable in environmentally sensitive areas such as national parks, or densely settled areas.

Unlike bait mixtures that attract fruit flies, cover sprays are limited by the efficiency of the application method.

#### Ground application<sup>8</sup>

- Apply fenthion (0.086%) cover spray over all plants bearing fruit.
- The ground beneath should be sprayed from the trunk to the outer perimeter of the foliage.
- Compost heaps and areas where household scraps are buried should also be sprayed.
- This spray is applied to kill eggs and larvae within fruit, as well as adult flies.
- Up to three applications at 10-day intervals are usually required.
- After every application, the property owner should be advised not to use or sell fruit for 7 days.
- Property owners objecting to the use of cover sprays can be given the alternative choice of having all susceptible fruit stripped and removed for disposal.
- When susceptible fruit is near fish ponds, aviaries, poultry yards etc. and there is a risk of contaminating these areas, the fruit should be stripped rather than sprayed.
- Appropriate workplace health and safety procedures must be observed.

### 4. Treatment of larvae and pupae in soil<sup>9</sup> under susceptible hosts:

Note. This option has limited application as a control or eradication strategy for melon fly, especially in cucurbit crops which cover the ground. Treatment may need NRA approval

- Apply chlorpyrifos at the rate of 176 mL product (Lorsban® 500 g/L) to 100 L (30 mL to 17 L) to soil to kill larvae or pupae.
- Apply to the ground from the trunk to the outer perimeter of the foliage. Also apply to compost heaps.
- Take care not to spray or drift insecticide into fish ponds, aviaries, pet food, water containers or onto live animals.

<sup>8</sup> Source: Fruit Fly Detection and Eradication manual. Primary Industries SA Pest Eradication Unit. September 1997.

<sup>9</sup> Source: : Fruit Fly Detection and Eradication manual. Primary Industries SA Pest Eradication Unit. September 1997.

## **Response phase - ERADICATION**

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### **5. Hygiene and fruit stripping:**

Hygiene and fruit stripping is most useful in small outbreaks and in situations where the risk of female dispersal is reduced. It is a useful option when property owners object to chemical treatments. Disposing of stripped fruit may pose logistical problems over larger areas and for heavily-bearing and large-fruited crops (such as pumpkins).

Strip all ripe fruit and collect fallen fruit. Cut and examine a percentage (arbitrarily one-quarter of those available) for fruit fly larvae (see Step 9). Leave green or ripening fruit to reduce risk of dispersal of female flies searching for suitable oviposition sites.

Dispose of fruit using the following methods:

- Deep burial - no less than 0.6m, backfill to be compacted.
- Dip fruit completely in an insecticide recommended as a quarantine treatment, or treat with maldison dust and bury as above.
- Seal fruit in heavy-duty plastic bags and leave the bags in the hot sun for several days (applicable for summer grown fruits in all states, but may not be effective in winter in cool-temperate states e.g. NSW, Vic., Tas., SA and southern districts of WA).
- Mulch fruit completely in a garden mulcher and treat or dispose of mulch by one of the methods recommended above.
- Spraying fruit and leaving it on the ground is not acceptable.

### **6. Sterile Insect Technology (SIT):**

SIT may be used to eradicate a small residual population of melon fly after other methods - male annihilation and bait spraying in particular, have reduced the outbreak to a low level. SIT involves flooding the wild population with sterile males, which out-compete the few remaining wild fertile males. Mating of sterile males with fertile females results in infertile eggs.

Since male annihilation is less effective with cue-lure responding species than it is with ME responding species, the feasibility of using SIT should be evaluated relatively early in the containment phase of a melon fly incursion.

The expense and technical complexity of SIT are such that a specialised task force should be established to advise PHC and SCARM/ARMCANZ on the feasibility of introduction of SIT. This would draw on overseas experience (e.g. Okinawa in Japan where melon fly has successfully been eradicated using SIT) in developing recommendations.

If SIT is considered necessary for melon fly in Australia, the possibility of importing sterile pupae produced overseas e.g. Japan should be considered, provided the available strain is genetically compatible with the local population.

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### **STEP 40. Maintain monitoring**

**(State)**

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Procedures for monitoring during eradication are the same as for the detection and containment phases, except that particular attention is paid to:

- identifying 'hot spots' and monitoring progress towards eradication, and

## **Response phase - ERADICATION**

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- collecting information required to re-establish Area Freedom.

Before monitoring to re-establish Area Freedom begins (see Step 49), blocks or other material containing cue-lure must be removed. High priority given to recording accurate details of block placement (Step 39) will facilitate 'total' recovery of spent blocks. Public cooperation should also be sought in reporting blocks missed by block recovery teams through newspaper notices, letterbox drops etc. The block recovery period should extend for 3 months to allow cue-lure in any un-recovered blocks or other material to reduce to a level where it will not interfere with pre-Area Freedom monitoring.

NOTE: In practice, the time needed for block removal and lure dispersal, plus pre-Area Freedom monitoring, equates to about a 6-month lag leading up to any declaration of Area Freedom, provided no melon fly are caught in the process.

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### **STEP 41. Maintain industry and community awareness (State)**

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The State Quarantine Officer ensures that there is an ongoing flow of information to affected property owners, travellers and the general public at the local level, to maintain awareness of all relevant developments in the eradication program. Topics may include progress achieved towards eradication of melon fly and any changes to quarantine restrictions etc. This communication program should use strategies consistent with those listed at Step 26.

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### **STEP 42. PHC CC - Monitor progress (National)**

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PHC CC will monitor progress throughout the eradication campaign, and recommend technical adjustments.

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### **STEP 43. Report to PHC (State)**

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The State Quarantine Officer issues regular progress reports and special reports as required e.g. when significant events occur. These reports update (as appropriate) information under the headings listed under Step 19, as well as advising on:

- progress in monitoring and eradication activities,
- effectiveness of mechanisms for controlling movement of declared produce and other quarantinable items,
- any other information on the outbreak needed to increase the chances of successful eradication, and
- a suggested timetable for eradication and re-establishment of Area Freedom.

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### **STEP 44. SCARM/ARMCANZ - Approve annual budget (National)**

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## **Response phase - ERADICATION**

SCARM/ARMCANZ will receive regular advice and progress reports from PHC and approve annual budgets.

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### **STEP 45. Final report to PHC**

**(State)**

This report is prepared by the State Quarantine Officer when the campaign is to be terminated because either:

- eradication has been achieved, as defined under Step 46, and endorsed by PHC CC, or
- PHC CC decides that, for technical reasons, the eradication campaign is unlikely to be successful and recommends termination to SCARM.

The report will provide an overview of the campaign and the reasons for termination.

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### **STEP 46. PHC CC/PHC - Endorse successful eradication, or recommend termination; report to SCARM**

**(National)**

The nominated criteria for declaration of eradication of melon fly are:

- all male annihilation methods used to kill but not trap melon flies have been withdrawn or become ineffective (a period of 3 months should be allowed for cue-lure to disperse, as indicated under Step 40), and
- no adult flies or larvae have been detected for a subsequent period of 12 weeks or one generation plus 28 days (whichever is the longer).

On the advice of the State Quarantine Officer that the eradication criteria have been met, PHC CC endorses successful eradication and notifies PHC, which advises SCARM/ARMCANZ.

NOTE: In practice, the time needed for block removal and lure dispersal, plus pre-Area Freedom monitoring, equates to about a 6-month lag leading up to any declaration of Area Freedom, provided no melon fly are caught in the process.

If it becomes apparent that eradication is not possible, PHC CC advises PHC which recommends to SCARM/ARMCANZ that the campaign be terminated.

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### **STEP 47. AQIS - Notify trading partners**

**(National)**

AQIS will notify trading partners of the outcome of the response actions i.e. that melon fly is declared eradicated, or eradication was not achieved and that melon fly is considered to be endemic outside defined Area Freedom zones.

## **Response phase - ERADICATION**

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AQIS will re-negotiate Area Freedom requirements.

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### **STEP 48. IPHRWG - review intra- and interstate quarantine arrangements (National)**

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If the eradication campaign is unsuccessful, the intra- and interstate quarantine arrangements will be referred to IPHRWG for review.

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### **STEP 49. Re-establish Area Freedom (State)**

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Area Freedom may be re-established by the affected state when a significant part or all of the quarantine area meets the requirements listed under Step 46. The State Quarantine Officer notifies their counterparts in other states, PHC, and AQIS of the boundaries of the area that once again meets Area Freedom requirements.

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### **STEP 50. Resume normal surveillance (State)**

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After eradication is declared according to the criteria in Step 46, ie. all male annihilation methods used to kill but not trap flies have been withdrawn, and no adult flies or larvae have been detected for a period of 12 weeks or one generation plus 28 days (whichever is the longer), the trapping schedule may revert to pre-detection levels (see Steps 1 and 2), or other such trapping regime as determined by the State authority to be appropriate at the time.



## APPENDIX 1

### IDENTIFICATION OF MELON FLY



Melon fly (adult female)- *Bactrocera cucurbitae* (Coquillett)

Photograph provided by Dr T Teruya, Fruit Fly Eradication Project Office, Okinawa Prefectural Government, Naha 902, Japan.

#### Key distinguishing features of melon fly

The following characters may be used to help differentiate melon fly from other fruit flies likely to be found in cue lure traps in Australia. A microscope will be needed to adequately view some characters. In all cases, tentative identifications should be confirmed by a State Fruit Fly Identifying Entomologist (listed in Step 3) or another suitably qualified insect taxonomist.

**General:** medium-sized tropical fruit fly (Tribe Dacini).

**Head:** facial spots large and oval.

**Thorax:** Viewed from above:

- mesonotum red-brown with fuscous (darker) markings,
- three yellow post-sutural vittae (stripes) present (one on each side of thorax and one medial,
- scutellum yellow.

Viewed from the side:

- mesopleural stripes of medium width,
- postpronotal and notopleural calli yellow,

**Wing:** Colourless except for the following pattern of markings:

- broad fuscous (dark) costal band (along front margin of wing) expanded into a large spot at the apex,
- fuscous (dark) anal streak (extending from base of wing towards hind margin),

## APPENDIX 1

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- infuscation on cross-vein *r-m* visible as a triangular wedge extending backwards from about the midpoint of the costal band;
- infuscation on cross-vein *dm-cu* visible as a dark smudge extending forwards from the hind margin of the wing;

Note: infuscation on *r-m* usually weaker than that on *dm-cu*,

- costal cells at base of wing (directly behind front margin) colourless, with microtrichia (minute hairs visible under high magnification) present on outer portion of second costal cell

*Abdomen:*

Viewed from above:

- abdominal tergites III to V orange-brown with black markings as follows: narrow transverse band along anterior (front) margin of tergite III, anterolateral corners of each tergite, and medial longitudinal band on tergites III to V.

## APPENDIX 2

### PRODUCE TO BE DECLARED IN THE EVENT OF A CONFIRMED OUTBREAK OF MELON FLY

This Appendix lists produce to be declared in the event of a confirmed outbreak of melon fly.

**Part 1 lists fruits (and vegetative parts) of plants in the family Cucurbitaceae - melons, pumpkins, squashes, gourds, and their relatives. All species in this family are considered to be melon fly hosts. The sources of information used to establish host status are provided.**

**Part 2 provides the same information for hosts in other families.**

Where several species in a genus are clearly hosts and the status of other species is unclear, the entire genus is listed as "declared". This occurs for:

- *Annona* (custard apples and relatives)
- *Citrus* (all citrus types)
- *Passiflora* (passionfruit and relatives)
- *Psidium* (guava).

However with citrus and passionfruit in particular, closer investigation may indicate that some types are conditional or non-hosts. This will depend on experimental evidence not currently available, and is an issue requiring further attention.

Conversely, other species may be added to this list if evidence becomes available of melon fly breeding in them.

Part 1. Fruits and vegetative tissues of plant species in the family Cucurbitaceae		
Common Name	Scientific name	Source of information on which host status has been based (legend provided below)
All cucurbits, including;		
Balsam Apple	<i>Momordica balsamina</i>	S, W, A
Choko	<i>Sechium edule</i>	W, Reg/P, B
Colocynth	<i>Citrullus colocynthis</i>	S, W, A
Cucumber	<i>Cucumis sativus</i>	S, W, Reg/P, A
Cucumber, Horned	<i>Cucumis metuliferus</i>	W
Gherkin	<i>Cucumis sativus</i>	W, Reg/P, A
Gourd, bitter	<i>Momordica charantia</i>	S, W, A
Gourd, pointed	<i>Trichosanthes dioica</i>	W

Continued next page

## APPENDIX 2

Table 1 (Continued)

Common Name	Scientific name	Source of information on which host status has been based (legend provided below)
Gourd, snake	<i>Trichosanthes cucumerina</i>	S, W, B
Gourd, wax	<i>Benincasa hispida</i>	S, W, Reg/P
Gourd, white-flowered	<i>Lagenaria hispida</i>	W, A
Gourds	<i>Coccinea</i> spp. <i>Cucumis maxima</i> <i>Lagenaria siceraria</i>	S Reg/P S
Honeydew melon	<i>Cucumis melo</i>	W, Reg/P, A
Loofah, angled	<i>Luffa acutangula</i>	S, W, A, Étienne (1972)
Loofah, smooth	<i>Luffa aegyptiaca</i>	S, W, A
Marrow	<i>Cucurbita pepo</i>	W, Reg/P, A, Etienne (1972)
Melon, Oriental pickling	<i>Lagenaria siceraria</i>	S
Pumpkin	<i>Cucurbita maxima</i>	S, W, Reg/P, A
Pumpkin, Butternut	<i>Cucurbita moschata</i>	S, W, Reg/P, A
Rockmelon	<i>Cucumis melo</i>	S, W, Reg/P, A
Squash	<i>Cucurbita maxima</i> , <i>Cucurbita pepo</i>	W, Reg/P, A, Étienne (1972)
Squash, Hubbard	<i>Cucumis melo</i> var <i>conomon</i>	Reg/P, A
Teruah	<i>Momordica cochinchinensis</i>	S, W, B
Watermelon	<i>Citrullus lanatus</i>	S, W, Reg/P, A
Wild cucurbits	<i>Cucumis pubescens</i> <i>Cucumis trigonus</i>	Reg S
Zucchini	<i>Cucurbita pepo</i>	W, Reg/P, A, Étienne (1972)
(no common name)	<i>Melothria wallichii</i>	S
"	<i>Gymnopetalum integrifolium</i>	S
"	<i>Trichosanthes ovigera</i>	S
"	<i>T. tricuspida</i>	S
"	<i>T. wallichiana</i>	S
"	<i>T. wawraei</i>	S

## APPENDIX 2

Part 2. Fruit of specified hosts from other families		
Common Name	Scientific name	Source of information on which host status has been based (legend provided below)
Apple, Crab	<i>Malus sylvestris</i>	Reg/OH, B
Avocado	<i>Persea americana</i>	W/ Reg/OH, B
Banana (conditional - mature green bananas are non-hosts)	<i>Musa</i> spp. & hybrids	W
Bean, Sieva (lima, or butter)	<i>Phaseolus lunatus</i>	Reg/P, B
Bean, French	<i>Phaseolus vulgaris</i>	S, W, Reg/B
Bean, Lablab (hyacinth)	<i>Lablab purpureus</i>	Reg/P
Bean, Yardlong (snake)	<i>Vigna unguiculata</i> ssp. <i>sesquipedalis</i>	W, S
Bell pepper	<i>Capsicum annuum</i>	Reg/P, B
Capsicum	<i>Capsicum annuum</i>	Reg/P, B
Citrus (all)	<i>Citrus</i> spp. (all)	
Cowpea	<i>Vigna unguiculata</i>	S, W, Reg/ P
Cowpea	<i>Vigna sinensis</i>	S
Custard apple	<i>Annona</i> spp. (all)	Reg/OH
Date palm	<i>Phoenix dactylifera</i>	B
Eggplant	<i>Solanum melongena</i>	Reg/ P, B
Fig	<i>Ficus carica</i>	W, Reg/P, B
Granadilla	<i>Passiflora laurifolia</i>	W, B
Granadilla, Giant	<i>Passiflora quadrangula</i>	B
Grapefruit	<i>Citrus paradisi</i>	Reg/OH
Guava	<i>Psidium</i> spp. (all)	S, Reg/P
Jackfruit	<i>Artocarpus heterophyllus</i>	W
Jujube, Indian	<i>Ziziphus jujuba</i>	S
Lemon	<i>Citrus limon</i>	included as a <i>Citrus</i> species
Mandarin	<i>Citrus reticulata</i>	Reg/P, B
Mango	<i>Mangifera indica</i>	W, Reg/P, B
Nectarine	<i>Prunus persica</i>	Reg/P, B
Okra	<i>Abelmoschus esculentus</i>	Reg/OH, B
Orange, king	<i>Citrus nobilis</i>	Reg/P
Orange, Sweet	<i>Citrus sinensis</i>	W, Reg/P, B
Papaya	<i>Carica papaya</i>	W, Reg/P, B
Passionfruit (all)	<i>Passiflora</i> spp.	B
Peach	<i>Prunus persica</i>	W, Reg/P, B
Pepper, Tabasco	<i>Capsicum frutescens</i>	Reg/OH, B
Pepper, Chilli	<i>Capsicum annuum</i>	Reg/OH, B
Pigeon pea	<i>Cajanus cajan</i>	Reg/P
Pummelo	<i>Citrus maxima</i>	W, Reg/OH
Quince	<i>Cydonia oblonga</i>	W

## APPENDIX 2

Continued next page  
Table 2 (Continued)

Common Name	Scientific name	Source of information on which host status has been based (legend provided below)
Sapodilla	<i>Manilkara zapota</i>	S
Sea almond	<i>Terminalia catappa</i>	Étienne, 1972
Soursop	<i>Annona muricata</i>	Reg OH/B
Strawberry, Chilean	<i>Fragaria chiloensis</i>	Reg/OH, B
Sugar apple	<i>Annona squamosa</i>	Reg/OH, C
Tomato	<i>Lycopersicon esculentum</i>	S, W/Reg/P, A
Tree tomato	<i>Cyphomandra betacea</i>	W, A
Wild waterlemon	<i>Passiflora laurifolia</i>	Reg/P, B
Water apple	<i>Syzygium samarangense</i>	W
(no common name)	<i>Abelmoschus moschatus</i>	S
"	<i>Capparis seiparia</i>	S
"	<i>Capparis thornellii</i>	S
"	<i>Citrus hystrix</i>	S
"	<i>Crescentia</i> spp.	W/ Reg/P
"	<i>Dracaena curtissi</i>	S
"	<i>Ficus chartacea</i>	S
"	<i>Maerua siamensis</i>	S
"	<i>Solanum trilobatum</i>	S
"	<i>Tetrastigma lanceolarium</i>	S

### Legend

W = listed as a host in White I M and Elson-Harris M M (1992). Fruit flies of economic significance: their identification and bionomics. CAB International. Wallingford. 601 pp.

S = listed as a host in Southeast Asian data base. Host plants recorded for fruit flies (Diptera: Tephritidae) in southeast Asia by A J Allwood, A Chinajriyawong, R A I Drew, E L Hamacek, D L Hancock, C Hengsawad, J C Jipanin, M Jirasurat, C Kong Krong, S Kritsaneepaiboon, C T S Leong and S. Vijaysegaran. Database maintained by QDPI.

Reg = regulated by USDA. Sources "Action plan for Melon Fruit Fly *Dacus cucurbitae* Coquillett. California Department of Food and Agriculture, Division of Plant Industry. Revised March 1989. P and OH = "Preferred" and "Other Hosts" ratings listed in the 1984 edition.

A, B = rating provided in "Melon Fly *Dacus cucurbitae*. Prepared by Biological Assessment Support Staff, Plant Protection and Quarantine, USDA". A and B indicate high probability as a host.

## APPENDIX 2

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**Étienne, J. 1972** Les principales Trypétides nuisibles de l'île de la Réunion. *Ann. Soc. ent. Fr. (n.s.)* 8 (2): 485-491.

## Mark Smith

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From: Cantrell, Bryan <Cantreb@prose.dpi.qld.gov.au>  
To: 'Mark Smith' <smitham@ozemail.com.au>  
Subject: RE: Final report  
Date: Thursday, 17 June 1999 15:08

Mark

I have been slowly working on the Melon Fly Contingency Plan as time permits and thought that I had it 'almost there'. However, in discussing the overall plan recently with Keith Jorgensen, he suggested that we delay finalisation until after two upcoming meetings - perhaps these include the ones you were alluding to.

The first meeting is that of the Interstate Plant Health Regulation Working Group later this month. Keith suggests that the group 'sign off' on the quarantine protocols in the plan at that meeting. This section is quite detailed, as you may imagine.

The second meeting is the fruit fly surveillance workshop in early July, that will result in an amended national surveillance system. Keith suggests that we should wait and include new details in the surveillance section of the plan. That meeting may also reveal more information on the planned review of the New Zealand NASS Standard 158.03.07 that Australia must work to.

I find it difficult to argue against Keith's logic, but would value your opinion. If necessary, I am happy to provide draft copies to the participants in these meetings. I will attach a file to this message in the hope that it transmits to you; if not I can send a hard copy.

In the meantime, I will continue to assemble copies of back-up information to go with the final plan.

Bryan Cantrell

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<<Melon fly\_final.doc>>

> -----Original Message-----

> From: Mark Smith [SMTP:smitham@ozemail.com.au]

> Sent: Wednesday, June 16, 1999 2:31

> To: cantreb@dpi.qld.gov.au

> Subject: Final report

>

> Bryan

>

> How is the final report going for 'National contingency plan for

> incursions

> of melon fly and other exotic fruit flies'? As you know it is overdue.

>

> There are a few important meetings and workshops coming up that may

> benefit

> form your report.

>

> Please contact me.

>

> Mark

>