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para la
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y la
Alimentación

COMMISSION ON PHYTOSANITARY MEASURES

First Session

Rome, 3 – 7 April 2006

Adoption of International Standards

Agenda Item 11.2 of the Provisional Agenda

I. INTRODUCTION

1. Four draft International Standards for Phytosanitary Measures (ISPMs), given in Annexes I-IV, are submitted to the Commission on Phytosanitary Measures (CPM) for consideration.
2. One is a revision to an existing International Standard for Phytosanitary Measures (ISPM): ISPM No. 1 (*Principles of plant quarantine as related to international trade*). The title has been changed to: *Phytosanitary principles and concepts for the protection of plants*.
3. The remaining three documents are new ISPMs:
 - Consignments in transit
 - Establishment of pest free areas for fruit flies (Tephritidae)
 - Diagnostic protocols for regulated pests.
4. In April 2005, the Standards Committee (SC) reviewed the drafts and approved them to be sent for country consultation. The drafts were sent out in June 2005 for the 100 day country consultation period. Technical, translation and editorial comments were received from 64 individual countries and from the EC and its Members States. In addition to comments by countries, the Secretariat received comments from 5 Regional Plant Protection Organizations (RPPOs), namely: Asia and Pacific Plant Protection Commission (APPPC), Comité Regional De Sanidad Vegetal Del Cono Sur (COSAVE), European and Mediterranean Plant Protection Organization (EPPO), Organismo Internacional Regional De Sanidad Agropecuaria (OIRSA) and Pacific Plant Protection Organization (PPPO). Seven IPPC regional workshops on draft ISPMs were also organized to support the preparation of country comments and were attended by 114 countries from Asia, French- and English-speaking Africa, the Caribbean, Latin America, Near East and the Pacific. The Secretariat received over 1800 comments on these draft standards. The SC considered the comments and revised the draft standards as appropriate.
5. In accordance with the decision at the 6th Session of the ICPM (April 2004) in relation to the improvements of standard-setting procedures (Appendix IX, point 3 of the report), countries are invited to take the following points into account:

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- a) Members should endeavour to provide only substantive comments at meetings of the CPM.
- b) Members should endeavour to provide comments in writing to the Secretariat at least 14 days before the CPM. The Secretariat will provide a copy of all comments received, in original form, at the start of the CPM.
- c) Members should indicate comments that are strictly editorial (do not change the substance) and could be incorporated by the Secretariat as considered appropriate and necessary.
- d) The electronic format/matrix for country comments should preferably be used for submitting comments and can be found on the IPP (www.ippc.int) or requested from the IPPC Secretariat).

6. In accordance with the decision of the 6th Session of the ICPM (April 2004), all country comments from the June-September 2005 country consultation are available on the IPP (www.ippc.int). In addition, countries are invited to refer to the draft report of the SC (November 2005) for an overview of the main points of discussion.

II. REVISION OF ISPM NO. 1: PHYTOSANITARY PRINCIPLES AND CONCEPTS FOR THE PROTECTION OF PLANTS (ANNEX I)

7. FAO Conference adopted ISPM No. 1 (*Principles of plant quarantine as related to international trade*) in November 1993, before the World Trade Organization's Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) entered into force in 1994 and before the revision of the IPPC in 1997. ICPM-4 (2002) identified the review and revision of the standard as a priority and included it in the standard setting work programme. An expert working group (EWG) meeting was held in Paris, France, in February 2004 and a revised version of the standard, including a revised title, was submitted to the SC in May 2004. The SC decided that an additional EWG should be held to resolve how the standard relates and refers to the Convention (1997). A second version was drafted by an EWG, complemented by legal counsel, that took place in Rome, Italy, in October 2004. This second draft of the revised ISPM No. 1 was reviewed by the SC in April 2005 and submitted for country consultation in June 2005.

8. 223 comments were compiled and submitted for review by the SC in November 2005. The SC adjusted the draft as appropriate and recommended it for adoption by the CPM.

9. The CPM is invited to:

Adopt as ISPM No. 1 (2005) Phytosanitary principles and concepts for the protection of plants, contained in Annex I.

III. CONSIGNMENTS IN TRANSIT (ANNEX III)

10. The 5th session of the ICPM (2003) added the topic of transit to the work programme. An EWG was held in Riga, Latvia in February 2004 and, after review by the SC, the first draft of the standard was sent for country consultation in June 2004. In November 2004, taking into account concerns raised at country consultation, such as the relationship in the draft between Customs and NPPOs, the SC decided that the draft standard should be redrafted by a group of experts to address those concerns. A second draft was reviewed in April 2005 by the SC and submitted for a second country consultation in June 2005.

11. 270 comments were compiled and submitted for review by the SC in November 2005. The SC adjusted the draft as appropriate and recommended it for adoption by the CPM.

12. The CPM is invited to:

Adopt as an ISPM: Consignments in transit, contained in Annex II.

IV. ESTABLISHMENT OF PEST FREE AREAS FOR FRUIT FLIES (TEPHRITIDAE) (ANNEX III)

13. The first meeting of the Technical Panel on pest free area and systems approaches for fruit flies was held in Bangkok, Thailand in September 2004, and drafted a standard on the establishment of pest free areas for fruit flies. The draft was reviewed by the SC in April 2005 and submitted for country consultation in June 2005.

14. 981 comments were compiled and submitted for review by the SC in November 2005. The SC adjusted the draft as appropriate and recommended it for adoption by the CPM.

15. The CPM is invited to:

Adopt as an ISPM: Establishment of pest free areas for fruit flies (Tephritidae), contained in Annex III.

V. DIAGNOSTIC PROTOCOLS FOR REGULATED PESTS (ANNEX IV)

16. The first meeting of the Technical Panel to develop diagnostic protocols for specific pests was held in York, United Kingdom in September 2004, and drafted a standard on diagnostic protocols for regulated pests. The draft was reviewed by the SC in April 2005 and submitted for country consultation in June 2005.

17. 386 comments were compiled and submitted for review by the SC in November 2005. The SC adjusted the draft as appropriate and recommended it for adoption by the CPM.

18. The CPM is invited to:

Adopt as an ISPM: Diagnostic protocols for regulated pests, contained in Annex IV.

**INTERNATIONAL STANDARDS FOR
PHYTOSANITARY MEASURES**

***PHYTOSANITARY PRINCIPLES AND CONCEPTS FOR THE
PROTECTION OF PLANTS***

ISPM No. 1 (200-)

Secretariat of the International Plant Protection Convention
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, ----

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INTRODUCTION

SCOPE

This standard describes phytosanitary principles and concepts for the protection of plants that are embodied in the International Plant Protection Convention (IPPC) and elaborated in its International Standards for Phytosanitary Measures. It covers principles and concepts related to the protection of plants, including cultivated and non-cultivated/unmanaged plants, wild flora and aquatic plants, those regarding the application of phytosanitary measures to the international movement of people, commodities and conveyances, as well as those inherent in the objectives of the IPPC. The standard does not alter the IPPC, extend existing obligations, or interpret any other agreement or body of law.

REFERENCES

Agreement on the Application of Sanitary and Phytosanitary Measures, 1994. World Trade Organization, Geneva.

Glossary of phytosanitary terms, 2004. ISPM No. 5, FAO, Rome.

International Plant Protection Convention, 1997. FAO, Rome.

All International Standards for Phytosanitary Measures.

DEFINITIONS

At its Seventh session in April 2005, the Interim Commission on Phytosanitary Measures adopted recommendations on the publication of ISPMs in a book format (see ICPM-7 report, paragraph 39 and Appendix II). This will contain a glossary chapter, i.e. the *Glossary of phytosanitary terms* (ISPM No. 5) in the relevant language.

The "definitions" section in the present ISPM, once integrated into the book, will not contain any definitions but will refer to the Glossary chapter of the book (ISPM No. 5). However, for the purpose of country consultation, this section contains terms or definitions which are new or revised in the present draft standard. Once this standard has been adopted, the new and revised terms and definitions will be transferred into the Glossary chapter of the book (ISPM No. 5), and will not appear in the standard itself.

New terms and definitions:

acceptable level of risk	Level of risk above which a contracting party applies phytosanitary measures
appropriate level of protection	The level of protection deemed appropriate by a contracting party establishing phytosanitary measures to protect plants within its territory

OUTLINE OF REQUIREMENTS

This standard describes the following basic principles under the IPPC: sovereignty, necessity, managed risk, minimal impact, transparency, harmonization, non-discrimination, technical justification, cooperation, equivalence of phytosanitary measures and modification. This standard also describes the operational principles and concepts under the IPPC. They are divided into three categories: establishment of phytosanitary measures, implementation of phytosanitary measures and administration of official phytosanitary systems. The operational principles and concepts are: pest risk analysis, pest listing, recognition of pest free areas and areas of low pest prevalence, official control for regulated pests, systems approach, surveillance, pest reporting, phytosanitary certification, phytosanitary integrity and security of consignments, prompt action, emergency measures, provision of a National Plant Protection Organization, dispute settlement, avoidance of administrative undue delays, notification of non-compliance, information exchange and technical assistance.

BACKGROUND

The original version of ISPM No. 1 (*Principles of plant quarantine as related to international trade*) was endorsed as a reference standard by the 27th Session of FAO Conference in 1993. It was developed at the time the Agreement on the Application of Sanitary and Phytosanitary Measures of the World Trade Organization (SPS Agreement) was being negotiated. It helped to clarify some of the elements of the SPS Agreement which were under discussion at that time. The SPS Agreement was adopted in April 1994, and experience has been gained since then on its practical application in relation to phytosanitary measures.

The new revised text of the IPPC was adopted by FAO Conference in 1997. It includes many changes to the 1979 version of the Convention. The revision of the IPPC in 1997 has meant that ISPM No. 1 required revision.

In addition to the SPS Agreement, other international conventions exist which also directly or indirectly deal with the protection of plants (for example, the Convention on Biological Diversity).

This standard aims to aid in the understanding of the IPPC and provides guidance on the fundamental elements in phytosanitary systems. The principles and concepts described below reflect key elements of the IPPC. In some cases, additional guidance on these elements is provided. The standard should be interpreted in accordance with the full text of the IPPC. Quotations from the IPPC are indicated in quotation marks and italics.

PRINCIPLES AND CONCEPTS

These principles and concepts are related to the rights and obligations of contracting parties to the IPPC. They should be considered together, as a single entity, and not interpreted individually, in accordance with the full text of the IPPC.

1. Basic principles

1.1 Sovereignty

Contracting parties have sovereign authority, in accordance with applicable international agreements, to prescribe and adopt phytosanitary measures to protect plant health within their territories and to determine their appropriate level of protection and acceptable level of risk to plant health.

In relation to phytosanitary measures, the IPPC provides that:

“With the aim of preventing the introduction and/or spread of regulated pests into their territories, contracting parties shall have sovereign authority to regulate, in accordance with applicable international agreements, the entry of plants and plant products and other regulated articles and, to this end, may:

- a) prescribe and adopt phytosanitary measures concerning the importation of plants, plant products and other regulated articles, including, for example, inspection, prohibition on importation, and treatment;*
- b) refuse entry or detain, or require treatment, destruction or removal from the territory of the contracting party, of plants, plant products and other regulated articles or consignments thereof that do not comply with the phytosanitary measures prescribed or adopted under subparagraph (a);*
- c) prohibit or restrict the movement of regulated pests into their territories;*
- d) prohibit or restrict the movement of biological control agents and other organisms of phytosanitary concern claimed to be beneficial into their territories.”* (Article VII.1)

In exercising this authority, and *“In order to minimize interference with international trade, ...”* (Article VII.2) each contracting party undertakes to act in conformity with the provisions of Article VII.2 of the IPPC.

1.2 Necessity

Contracting parties may apply phytosanitary measures only where such measures are necessary to prevent the introduction and/or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests. In this regard, the IPPC provides that: *“Contracting parties shall not,*

under their phytosanitary legislation, take any of the measures specified in ... unless such measures are made necessary by phytosanitary considerations ...” (Article VII.2a). Article VI.1b states that *“Contracting parties may require phytosanitary measures for quarantine pests and regulated non-quarantine pests, provided that such measures are ...limited to what is necessary to protect plant health...”*. Article VI.2 states that *“Contracting parties shall not require phytosanitary measures for non-regulated pests.”*

1.3 Managed risk

Contracting parties should apply phytosanitary measures based on a policy of managed risk, recognizing that risk of the spread and introduction of pests always exists when importing plants, plant products and other regulated articles. Contracting parties *“... shall institute only phytosanitary measures that are ... consistent with the pest risk involved ...”* (Article VII.2g).

1.4 Minimal impact

Contracting parties should apply phytosanitary measures with minimal impact. In this regard, the IPPC provides that they *“...shall institute only phytosanitary measures that ... represent the least restrictive measures available, and result in the minimum impediment to the international movement of people, commodities and conveyances.”* (Article VII.2g).

1.5 Transparency

Contracting parties shall make relevant information available to other contracting parties as set forth in the IPPC. In this regard, the IPPC states that, for example:

- *“... contracting parties shall, immediately upon their adoption, publish and transmit phytosanitary requirements, restrictions and prohibitions to any contracting party or parties that they believe may be directly affected by such measures.”* (Article VII.2b)
- *“Contracting parties shall, on request, make available to any contracting party the rationale for phytosanitary requirements, restrictions and prohibitions.”* (Article VII.2c)
- *“The contracting parties shall ... cooperate in the exchange of information on plant pests ...”* (Article VIII.1 & 1a).
- *“Contracting parties shall, to the best of their ability, establish and update lists of regulated pest ... and make such lists available ...”* (Article VII.2i)
- *“Contracting parties shall, to the best of their ability ... develop and maintain adequate information on pests status This information shall be made available ...”* (Article VII.2j).

1.6 Harmonization

Contracting parties should cooperate in the development of harmonized standards for phytosanitary measures. In this regard, the IPPC provides that *“The contracting parties agree to cooperate in the development of international standards ...”* (Article X.1). Contracting parties should *“... take into account, as appropriate, international standards when undertaking activities related to this Convention.”* (Article X.4). *“The contracting parties shall encourage any state or member organization of FAO, not a party to this convention ...to apply phytosanitary measures consistent with the provisions of this Convention and any international standards adopted hereunder.”* (Article XVIII).

1.7 Non-discrimination

Contracting parties should, in accordance with the IPPC, apply phytosanitary measures without discrimination between contracting parties if contracting parties can demonstrate that they have the same phytosanitary status and apply identical or equivalent phytosanitary measures.

Contracting parties should also apply phytosanitary measures without discrimination between comparable domestic and international phytosanitary situations.

In these regards, the IPPC provides that:

- *phytosanitary measures “... should not be applied in such a way as to constitute either a means of arbitrary or unjustified discrimination or a disguised restriction, particularly on international trade.”* (Preamble)

- contracting parties may require phytosanitary measures, provided that such measures are “... *no more stringent than measures applied to the same pests, if present within the territory of the importing contracting party.*” (Article VI.1a).

1.8 Technical justification

Contracting parties shall technically justify phytosanitary measures “...*on the basis of conclusions reached by using an appropriate pest risk analysis or, where applicable, another comparable examination and evaluation of available scientific information.*” (Article II.1). In this regard, the IPPC provides that “*Contracting parties shall not, under their phytosanitary legislation, take any of the measures specified in paragraph 1 of this Article (VII) unless such measures ... are technically justified.*” (Article VII.2a). Article VI.1b also refers to technical justification. Phytosanitary measures which conform to ISPMs are deemed to be technically justified.

1.9 Cooperation

Contracting parties should cooperate with one another to achieve the objectives of the IPPC. In particular, they “...*shall cooperate with one another to the fullest practicable extent in achieving the aims of [the] Convention ...*” (Article VIII). Contracting parties should also actively participate in bodies established under the IPPC.

1.10 Equivalence of phytosanitary measures

Importing contracting parties should recognize alternative phytosanitary measures proposed by exporting contracting parties as equivalent when those measures are demonstrated to achieve the same level of protection as the existing measures of the importing contracting party.

Relevant ISPM: ISPM No. 24.

1.11 Modification

Modifications of phytosanitary measures should be determined on the basis of a new or updated pest risk analysis or relevant scientific information. Contracting parties should not arbitrarily modify phytosanitary measures. “*Contracting parties shall, as conditions change, and as new facts become available, ensure that phytosanitary measures are promptly modified or removed if found to be unnecessary.*” (Article VII.2h).

Relevant Articles in the IPPC: VII.2h.

2. Operational principles and concepts

Specific IPPC principles related to the implementation and monitoring have been subdivided into three categories: the establishment of phytosanitary measures; the implementation of those phytosanitary measures; and the administration of official phytosanitary systems.

2.1 Establishment of phytosanitary measures

2.1.1 Pest risk analysis

National Plant Protection Organizations (NPPOs) should, when performing pest risk analysis, base it on biological or other scientific and economic evidence, following the relevant ISPMs. In doing this, threats to biodiversity resulting from effects on plants should also be taken into account.

Relevant Articles in the IPPC: Preamble, Articles II, IV.2f and VII.2g.

Relevant ISPMs: No 2, No. 5 (including supplement No. 2), No. 11 and No. 21.

2.1.2 Pest listing

Contracting parties “... *shall, to the best of their ability, establish and update lists of regulated pests ...*” (Article VII.2i).

Relevant Articles in the IPPC: VII.2i.

Relevant ISPMs: No. 19.

2.1.3 Recognition of pest free areas and areas of low pest prevalence

Contracting parties should ensure that their phytosanitary measures concerning consignments moving into their territories take into account the status of areas, as designated by the NPPOs of the

exporting countries. These may be areas where a regulated pest does not occur or occurs with low prevalence or they may be pest free production sites or pest free places of production.

Relevant articles in the IPPC: II.

Relevant ISPMs: No. 4, No. 8, No. 10 and No. 22.

2.1.4 Official control for regulated pests

When a pest which is present in a country is regulated as a quarantine pest or regulated non-quarantine pest, the contracting party should ensure that the pest is being officially controlled.

Relevant ISPM: ISPM No. 5 (including supplement No. 1).

2.1.5 Systems approach

Integrated measures for pest risk management, applied in a defined manner, may provide an alternative to single measures to meet the appropriate level of phytosanitary protection of an importing contracting party.

Relevant ISPM: No 14.

2.2 Implementation of phytosanitary measures

2.2.1 Surveillance

Contracting parties should collect and record data on pest occurrence and absence to support phytosanitary certification and the technical justification of their phytosanitary measures. In this regard, the IPPC also provides that “*Contracting parties shall, to the best of their ability, conduct surveillance for pests and develop and maintain adequate information on pest status in order to support categorization of pests, and for the development of appropriate phytosanitary measures.*” (Article VII.2j).

Relevant Articles in the IPPC : IV.2b, IV.2e and VII.2j.

Relevant ISPMs: No. 6 and No. 8.

2.2.2 Pest reporting

Contracting parties “... shall cooperate ... to the fullest practicable extent in ... the reporting of the occurrence, outbreak or spread of pests that may be of immediate or potential danger ...” to other contracting parties (Article VIII.1a). In this respect, they should follow the procedures established in ISPM No. 17 and other relevant procedures.

Relevant Article in the IPPC: VIII.1a.

Relevant ISPM: No. 17.

2.2.3 Phytosanitary certification

Contracting parties should exercise due diligence in operating an export certification system and ensuring the accuracy of the information and additional declarations contained in phytosanitary certificates. “*Each contracting party shall make arrangements for phytosanitary certification ...*” (Article V).

Relevant Articles in the IPPC: IV.2a and V.

Relevant ISPMs: No. 7 and No. 12.

2.2.4 Phytosanitary integrity and security of consignments

In order to maintain the integrity of consignments after certification, contracting parties, through their NPPO, shall “*ensure through appropriate procedures that the phytosanitary security of consignments after certification regarding composition, substitution and reinfestation is maintained prior to export.*” (Article IV.2g).

Relevant Articles in the IPPC: IV.2g and V.

Relevant ISPMs: No. 7 and No. 12.

2.2.5 Prompt action

Contracting parties should ensure that inspection or other phytosanitary procedures required at import “... shall take place as promptly as possible with due regard to ... perishability” of the regulated article (Article VII.2e).

Relevant Article in the IPPC: VII.2e.

2.2.6 Emergency measures

Contracting parties may adopt and/or implement emergency actions, including emergency measures, when a new or unexpected phytosanitary risk is identified¹. Emergency measures should be temporary in their application. The continuance of the measures should be evaluated by pest risk analysis or other comparable examination as soon as possible, to ensure that the continuance of the measure is technically justified.

Relevant Article in the IPPC): VII.6.

Relevant ISPM: No. 13.

2.3 Administration of official phytosanitary systems

2.3.1 Provision of a NPPO

“Each contracting party shall make provision, to the best of its ability, for an official national plant protection organization with the main responsibilities set out in [Article IV.1].” (Article IV.1).

Relevant Article in the IPPC): IV.

2.3.2 Dispute settlement

Contracting parties should be open to consultation regarding their phytosanitary measures, when requested by other contracting parties. If there is a dispute regarding the interpretation or application of the IPPC or its ISPMs, or if a contracting party considers that an action by another contracting party is in conflict with the obligations of the IPPC or guidance provided in its ISPMs, *“... the contracting parties concerned shall consult among themselves as soon as possible with a view to resolving the dispute.”* (Article XIII.1). If the dispute cannot be resolved in this way, then the provisions of Article XIII relating to the settlement of disputes or other means of dispute settlement may be applied².

Relevant Article in the IPPC): XIII.

2.3.3 Avoidance of administrative undue delays

When a contracting party requests another contracting party to modify or remove phytosanitary import requirements, when conditions have changed or new facts have become available, this request should be considered promptly. Associated procedures, which include, but are not limited to, pest risk analysis, recognition of pest free areas or recognition of equivalence, should also be performed promptly.

Relevant Article in the IPPC: VII.2h.

Relevant ISPM: No. 24 (section 2.7 and annex I, step 7).

2.3.4 Notification of non-compliance

Importing contracting parties *“... shall, as soon as possible, inform the exporting contracting party concerned...of significant instances of non-compliance with phytosanitary certification.”* (Article VII.2f).

Relevant Article in the IPPC: VII.2f.

Relevant ISPM: No. 13.

2.3.5 Information exchange

Contracting parties shall, as appropriate, provide information specified in the IPPC, as follows:

- Official contact points (Article VIII.2)
- Description of the NPPO and organizational arrangements of plant protection (Article IV.4)
- Phytosanitary requirements, restrictions and prohibitions (Article VII.2b) (including specified points of entry - Article VII.2d) and their rationale (Article. VII.2c)
- List of regulated pests (Article. VII.2i)
- Pest reporting, including occurrence, outbreak and spread of pests (Articles IV.2b and VIII.1a)
- Emergency actions (Article VII.6) and non-compliance (Article VII.2f)
- Pest status (Article VII.2j)

¹ The term emergency actions in Article VII.6 of the IPPC is interpreted to include emergency measures as defined in ISPM No. 5.

² A non-binding dispute settlement procedure has been developed by the IPPC for use by the contracting parties.

- Technical and biological information necessary for pest risk analysis (to the extent practicable) (Article VIII.1c).

2.3.6 Technical assistance

Contracting parties “... agree to promote the provision of technical assistance to contracting parties, especially those that are developing contracting parties ... with the objectives of facilitating the implementation of the Convention.” (Article XX).

INTERNATIONAL STANDARDS FOR PHYTOSANITARY MEASURES

CONSIGNMENTS IN TRANSIT

Secretariat of the International Plant Protection Convention
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, ----

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INTRODUCTION

SCOPE

This standard describes procedures to identify, assess and manage phytosanitary risks associated with consignments of regulated articles which pass through a country without being imported, in such a manner that any phytosanitary measures applied in the country of transit are technically justified and necessary to prevent the introduction into and/or spread of pests within that country.

REFERENCES

Glossary of phytosanitary terms, 2004. ISPM No. 5, FAO, Rome.
Guidelines for a phytosanitary import regulatory system, 2004. ISPM No. 20, FAO, Rome.
Guidelines for inspection, 2005. ISPM No. 23, FAO, Rome.
Guidelines for pest risk analysis, 1996. ISPM No. 2, FAO, Rome.
Guidelines for phytosanitary certificates, 2001. ISPM No. 12, FAO, Rome.
Guidelines for the notification of non-compliance and emergency action, 2001. ISPM No. 13, FAO, Rome.
International Plant Protection Convention, 1997. FAO, Rome.
Pest reporting, 2002. ISPM No. 17, FAO, Rome.
Pest risk analysis for quarantine pests including analysis of environmental risks and living modified organisms, 2004. ISPM No. 11, FAO, Rome.

DEFINITIONS

At its Seventh session in April 2005, the Interim Commission on Phytosanitary Measures adopted recommendations on the publication of ISPMs in a book format (see ICPM-7 report, paragraph 39 and Appendix II). This will contain a glossary chapter, i.e. the *Glossary of phytosanitary terms* (ISPM No. 5) in the relevant language.

The "definitions" section in the present ISPM, once integrated into the book, will not contain any definitions but will refer to the Glossary chapter of the book (ISPM No. 5). However, for the purpose of country consultation, this section contains terms or definitions which are new or revised in the present draft standard. Once this standard has been adopted, the new and revised terms and definitions will be transferred into the Glossary chapter of the book (ISPM No. 5), and will not appear in the standard itself.

Revised definition:

consignment in transit

A consignment which passes through a country without being imported, and that may be subject to official procedures.

OUTLINE OF REQUIREMENTS

International trade may involve the movement of consignments of regulated articles which pass through a country without being imported, under Customs¹ control. Such movements may present a phytosanitary risk to the country of transit. Contracting parties to the IPPC may apply measures to consignments in transit through their territories (Articles VII.1c and VII.2g of the IPPC, 1997), provided that the measures are technically justified and necessary to prevent the introduction and/or spread of pests (Article VII.4 of the IPPC, 1997).

This standard provides guidelines by which the National Plant Protection Organization (NPPO) of the country of transit may decide which movements require intervention of the NPPO and are subject to the application of phytosanitary measures, and if so, the type of phytosanitary measures to be applied. In such cases the responsibilities and elements of the transit system are described, together with the need for cooperation and communication, non-discrimination, review and documentation.

1 Customs agencies follow the "International Convention on the simplification and harmonization of Customs procedures", also known as the Kyoto Convention, 1973. It is an international instrument on the harmonization of Customs techniques which covers all aspects of Customs legislation including annex E1 concerning Customs transit and annex E2 concerning transshipment.

BACKGROUND

Consignments in transit and their conveyances are included within the scope of the IPPC in Article VII and in Article I.

Article VII.1c states:

“With the aim of preventing the introduction and/or spread of regulated pests into their territories, contracting parties shall have sovereign authority to regulate . . . and, to this end, may . . . prohibit or restrict the movement of regulated pests into their territories”.

Article VII.4 states:

“Contracting parties may apply measures specified in this Article to consignments in transit through their territories only where such measures are technically justified and necessary to prevent the introduction and/or spread of pests”.

Article I.4 states:

“Where appropriate, the provisions of this Convention may be deemed by contracting parties to extend, in addition to plants and plant products, to storage places, packaging, conveyances, containers, soil and any other organism, object or material capable of harbouring or spreading plant pests, particularly where international transportation is involved”.

Transit involves the movement of consignments of regulated articles which pass through a country (further referred to as country of transit) without being imported. Consignments in transit constitute a potential pathway for the introduction and/or spread of pests to the country of transit.

Consignments in transit may pass through the country of transit remaining enclosed and sealed if necessary, without being split up or combined with other consignments, and without having their packaging changed. Under such conditions, the movement of consignments will, in many cases, not present a phytosanitary risk and will not require phytosanitary measures, especially if the consignments are transported in sealed containers². However, even under such conditions, contingency plans may be required to address unexpected exposure of the commodity and potential pests, such as an accident during transit.

Consignments and their conveyances passing through a country in transit may, however, also be transported or handled in such a manner that they do present a phytosanitary risk to the country of transit. This may, for example, be the case when consignments are transported open rather than enclosed, or when they do not pass directly through the country but are held for a period of storage, or are split up, combined or repackaged, or if the means of transport changes (e.g. from ship to railway). In such cases, phytosanitary measures may be applied in the country of transit to prevent the introduction of pests into, and/or their spread within, that country.

It should be noted that the term ‘transit’ is not only used for phytosanitary purposes but is also the accepted name for the standard procedure for moving goods under Customs control. Customs control may include document verification, tracking (e.g. electronic), sealing, control of carrier and entry/exit control. Customs control by itself is not intended to guarantee phytosanitary integrity and security of consignments and thus will not necessarily offer protection against the introduction and/or spread of pests.

Transshipment is a particular aspect of transport of consignments between countries. It refers to the transfer of consignments from one conveyance (means of transport) to another (e.g. ship to ship at a seaport) during the transportation process. Usually transshipment takes place under Customs control within an area specified by Customs. Transshipment may occur in a transit country and is thus covered by this standard.

²A standard, fully enclosed and secure transport container as commonly used in ocean going trade.

REQUIREMENTS

1. Risk Analysis for the Country of Transit

Risk analysis related to consignments in transit would be facilitated by the sharing of relevant pest risk analysis (PRA) information already obtained and/or developed by one or both of the NPPOs of the importing and exporting contracting parties.

1.1 Risk identification

In order to identify potential phytosanitary risks related to consignments in transit, the NPPO of the country of transit (from this point onwards the NPPO) should collect and review relevant information.

Elements of such information may include:

- procedures applied by Customs and other relevant services
- classes of commodities or regulated articles in transit and their country of origin
- means and methods of transport for consignments in transit
- regulated pests associated with the consignments in transit
- host distribution in the country of transit
- knowledge of transit route in the country of transit
- possibilities that pests may escape from consignments
- existing phytosanitary measures for consignments of commodities in transit
- types of packaging
- conditions of transport (refrigeration, modified atmosphere, etc.).

The NPPO may decide that consignments in transit that pose no potential phytosanitary risk, for instance when no pests regulated by the country of transit are associated with the consignments in transit, may move or continue to move without phytosanitary procedures.

The NPPO may also decide that consignments in transit that pose negligible phytosanitary risks may move or continue to move without phytosanitary procedures, for example conveyances or packaging which are fully enclosed, sealed and secure, or when pests are regulated by the country of transit and are unlikely to escape from the consignment in transit.

If potential phytosanitary risks are identified, risk assessment for particular pests or commodities in transit is needed in order to identify the necessity and technical justification of any phytosanitary measure.

Only those phytosanitary risks which concern regulated pests in the country of transit or those pests that are under emergency action should be considered.

1.2 Risk assessment

An assessment of the phytosanitary risks associated with the transit pathway should normally focus only on evaluating the probability of pests being introduced or spread from consignments in transit. The associated potential economic consequences should have been evaluated in the case of a regulated pest and therefore should not need to be repeated.

Guidance for the assessment of the probability of introduction and spread of a pest is provided in ISPM No. 11 (2004, *Pest risk analysis for quarantine pests including analysis of environmental risks and living modified organisms*), in particular section 2.2. For consignments in transit, the following information may also be relevant:

- pathways for introduction and/or spread of regulated pests from the consignments in transit
- dispersal mechanism and mobility of the relevant pests
- means of transport (truck, rail, airplane, ship, etc.) and mode of transport (closed, sealed, refrigerated, etc.)
- packaging mode
- changes of configuration (combined, split, repacked)
- duration of transit or storage, and storage conditions

- route taken by the consignment prior to and within the country of transit
- frequency, volume and season of transit.

In cases where the NPPO, through risk assessment, has identified phytosanitary risks, pest risk management options can be considered.

1.3 Risk management

Based on risk assessment, consignments in transit may be classified into two broad categories:

- under Customs control only, or
- requiring NPPO intervention.

Further details on risk management are provided in ISPM No. 11 (2004, *Pest risk analysis for quarantine pests including analysis of environmental risks and living modified organisms*).

1.3.1 Transit under Customs control only

The NPPO, through the assessment of phytosanitary risk, may determine that Customs control alone is adequate. If this is the case, the NPPO should not apply any phytosanitary measures in addition to Customs control.

1.3.2 Transit requiring NPPO intervention

The risk assessment for consignments in transit may conclude that specific phytosanitary measures are necessary. These may include the following:

- verification of consignment identity or integrity (further details provided in ISPM No. 23: *Guidelines for inspection*)
- phytosanitary movement document (e.g. transit permit)
- phytosanitary certificates (with transit requirements)
- designated entry and exit points
- verification of exit of the consignment
- mode of transport and designated transit routes
- use of NPPO prescribed equipment or facilities
- Customs facilities recognized by the NPPO
- phytosanitary treatments (e.g. pre-shipment treatments, treatments when consignment integrity is doubtful)
- consignment tracking while in transit
- physical conditions (e.g. refrigeration, pest-proof packaging and/or conveyance preventing spillage)
- use of NPPO specific seals for conveyances or consignment
- specific carrier's emergency management plans
- transit time or season limits
- documentation in addition to that required by Customs
- inspection of consignment by NPPO
- packaging and disposal of waste.

Such phytosanitary measures should only be applied for regulated pests in the country of transit or those pests that are under emergency action.

1.3.3 Other phytosanitary measures

When appropriate phytosanitary measures for consignments in transit are not available or are impossible to apply, the NPPO may require that such consignments are subjected to the same requirements as imports, which may include prohibition.

If consignments in transit are stored or repackaged in such a way that they present a phytosanitary risk, the NPPO may decide that the consignments should meet import requirements or subject them to other appropriate phytosanitary measures.

2. Establishment of a Transit System

The contracting party may develop a transit system for phytosanitary control of consignments in transit with the NPPO, Customs and other relevant authorities as collaborators. The objective of such a transit system is to prevent the introduction into and/or spread within the country of transit of regulated pests associated with consignments in transit and their conveyances. Transit systems require a basis of a regulatory framework of phytosanitary legislation, regulations and procedures. The transit system is operated by the NPPO, Customs and other relevant authorities in cooperation as appropriate, and should ensure that prescribed phytosanitary measures are applied.

The NPPO has responsibility for the phytosanitary aspects of the transit system and establishes and implements phytosanitary measures necessary to manage phytosanitary risks, taking into account the transit procedures of Customs.

3. Measures for Non-compliance and Emergency Situations

The transit system may include measures, established by the NPPO, for non-compliance and emergency situations (for example, accidents in the country of transit which could lead to the unexpected escape of a regulated pest from a consignment moving in transit). ISPM No. 13 (*Guidelines for the notification of non-compliance and emergency action*) contains specific guidelines for the country of transit for issuing notices of non-compliance to the exporting country and, where appropriate, to the country of destination.

4. Cooperation and Domestic Communication

Cooperation between NPPOs and Customs and other authorities (for example, port authorities) is essential to establish and/or maintain an effective transit system and identify consignments of regulated articles in transit. Therefore specific agreement with Customs may be needed for the NPPO to be informed of, and have access to, consignments under Customs control.

The NPPO may also establish cooperation and maintain communication with all stakeholders involved in transit as appropriate.

5. Non-discrimination

Consignments in transit should not be subject to more restrictive phytosanitary measures than those applied to consignments of the same phytosanitary status imported into that country of transit.

6. Review

The NPPO should, as necessary, review and adjust the transit system, the types of consignments in transit and the associated phytosanitary risks, in cooperation with relevant authorities and stakeholders as appropriate.

7. Documentation

Any transit system should be adequately described and documented.

Phytosanitary requirements, restrictions and prohibitions for consignments in transit should be made available, upon request, to any contracting party or parties that may be directly affected by such measures.

**INTERNATIONAL STANDARDS FOR
PHYTOSANITARY MEASURES**

***ESTABLISHMENT OF PEST FREE AREAS FOR FRUIT FLIES
(TEPHRITIDAE)***

Secretariat of the International Plant Protection Convention
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, ----

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INTRODUCTION

SCOPE

This standard provides guidelines for the establishment and maintenance of the status of pest free areas for fruit flies (Tephritidae) of economic importance, but does not cover pest free places of production for fruit flies or pest free production sites for fruit flies.

REFERENCES

- Determination of pest status in an area*, 1998. ISPM No. 8, FAO, Rome.
Glossary of phytosanitary terms, 2004. ISPM No. 5, FAO, Rome.
Guidelines for pest eradication programmes, 1998. ISPM No. 9, FAO, Rome.
Guidelines for surveillance, 1997. ISPM No. 6, FAO, Rome.
International Plant Protection Convention, 1997. FAO, Rome.
Pest reporting, 2002. ISPM No. 17, FAO, Rome.
Requirements for the establishment of pest free areas, 1996. ISPM No. 4, FAO, Rome.
Requirements for the establishment of pest free places of production and pest free production sites, 1999. ISPM No. 10, FAO, Rome.

DEFINITIONS

At its Seventh session in April 2005, the Interim Commission on Phytosanitary Measures adopted recommendations on the publication of ISPMs in a book format (see ICPM-7 report, paragraph 39 and Appendix II). This will contain a glossary chapter, i.e. the *Glossary of phytosanitary terms* (ISPM No. 5) in the relevant language. The "definitions" section in the present ISPM, once integrated into the book, will not contain any definitions but will refer to the Glossary chapter of the book (ISPM No. 5).

OUTLINE OF REQUIREMENTS

The general requirements for establishing a fruit fly-pest free area (FF-PFA) include:

- the preparation of a public awareness programme
- the management elements of the system (documentation and review systems, record keeping), and
- supervision activities.

The major elements of the FF-PFA are:

- the characterization of the FF-PFA
- the establishment and maintenance of the FF-PFA.

These elements include the surveillance activities of trapping and fruit sampling, and official control on the movement of regulated articles. Detailed guidance on surveillance and fruit sampling activities are provided in Appendices 1 and 2.

Additional elements include: corrective action planning, suspension, loss of pest free status and reinstatement (if possible) of the FF-PFA. Corrective action planning is described in Annex 1.

BACKGROUND

Fruit flies are a very important group of pests for many countries due to their potential to cause damage in fruits and to their potential to restrict access to international markets for plant products associated with fruit flies. The high probability of introduction and establishment of fruit flies associated with a wide range of hosts results in restrictions imposed by many importing countries to accept fruits from areas in which these pests are established. For these reasons, there is a need for an ISPM that provides specific guidance for the establishment and maintenance of pest free areas for fruit flies.

A pest free area is “an area in which a specific pest does not occur as demonstrated by scientific evidence and in which, where appropriate, this condition is being officially maintained” (ISPM No. 5: *Glossary of phytosanitary terms*). Areas initially free from fruit flies may remain naturally free from fruit flies due to the presence of barriers or climate conditions, and/or maintained free through movement restrictions and related measures (though fruit flies have the potential to establish there) or may be made free by an eradication programme (ISPM No. 9: *Guidelines for pest eradication programmes*). ISPM No. 4 (*Requirements for the establishment of pest free areas*) describes different types of pest free areas and provides general guidance on the establishment of pest free areas. However, a need for additional guidance on establishment and maintenance of pest free areas specifically for fruit flies (fruit fly-pest free areas, FF-PFA) was recognized. This standard describes additional requirements for establishment and maintenance of FF-PFAs. The target pests for which this standard was developed include insects of the order Diptera, family Tephritidae, of the genera *Anastrepha*, *Bactrocera*, *Ceratitis*, *Dacus*, *Rhagoletis* and *Toxotrypana*.

REQUIREMENTS

1. General Requirements

The concepts and provisions of ISPM No. 4 (*Requirements for the establishment of pest free areas*) apply to the establishment and maintenance of pest free areas for all pests including fruit flies and therefore ISPM No. 4 should be referred to in conjunction with this standard.

Phytosanitary measures and specific procedures as further described in this standard may be required for the establishment and maintenance of FF-PFA. The decision to establish a formal FF-PFA may be made based on the technical factors provided in this standard. They include components such as: pest biology, size of the area, pest population levels and dispersal pathway, ecological conditions, geographical isolation and availability of methods for pest eradication.

FF-PFAs in accordance with this ISPM may be established under a variety of different situations. Some of them require the application of the full range of elements provided by this standard, others require only the application of some of these elements.

In areas where the fruit flies concerned are not capable of establishment because of climatic, geographical or other reasons, absence should be recognized according to the first paragraph of section 3.1.2 of ISPM No. 8 (*Determination of pest status in an area*). If, however, the fruit flies are detected and can cause economic damage during a season (Article VII.3 of the IPPC), corrective actions should be applied in order to allow the maintenance of a FF-PFA.

In areas where the fruit flies are capable of establishment and known to be absent, general surveillance in accordance with section 3.1.2 of ISPM No. 8 (*Determination of pest status in an area*), is normally sufficient for the purpose of delimiting and establishing a pest free area. Where appropriate, import requirements and/or domestic movement restrictions against the introduction of the relevant fruit fly species into the area may be required to maintain the area free from the pest.

The establishment and maintenance of a FF-PFA and its recognition implies that no other phytosanitary measures are required for the target species of fruit fly for host commodities from the PFA.

1.1 Public awareness

A public awareness programme is most important in areas where the risk of introduction is higher. An important factor in the establishment and maintenance of FF-PFAs is the support and participation of the public (especially the local community) close to the FF-PFA and individuals that travel to or through the

area, including parties with direct and indirect interests. The public and stakeholders should be informed through different forms of media (written, radio, TV) of the importance of establishing and maintaining the pest free status of the area, and of avoiding the introduction or re-introduction of potentially infested host material. This may contribute to and improve compliance with the phytosanitary measures for the FF-PFA. The public awareness and phytosanitary education programme should be ongoing and may include information on:

- permanent or random checkpoints
- posting signs at entry points and transit corridors
- disposal bins for host material
- leaflets or brochures with information on the pest and the pest free area
- publications (e.g. print, electronic media)
- systems to regulate fruit movement
- non-commercial hosts
- security of the traps
- penalties for non-compliance, where applicable.

1.2 Documentation and record keeping

The phytosanitary measures used for the establishment and maintenance of FF-PFA should be adequately documented. They should be reviewed and updated regularly, including corrective actions, if required (ISPM No. 4: *Requirements for the establishment of pest free areas*).

The records of surveys, detections, occurrences or outbreaks and results of other operational procedures should be retained for at least 24 months. Such records should be made available to the NPPO of the importing country on request.

1.3 Supervision activities

The FF-PFA programme, including regulatory control, surveillance procedures (both trapping and fruit sampling when used) and corrective action planning should comply with approved procedures.

Such procedures should include official delegation of responsibility assigned to key personnel, for example:

- a person with defined authority and responsibility to ensure that the systems/procedures are implemented and maintained appropriately;
- entomologist(s) with responsibility for the authoritative identification of fruit flies to species level.

The effectiveness of the programme should be monitored periodically by the NPPO of the exporting country, through review of documentation and procedures.

2. Specific Requirements

2.1 Characterization of the FF-PFA

The determining characteristics of the FF-PFA include:

- the target fruit fly species and its distribution within or adjacent to the area
- commercial and non-commercial host species
- delimitation of the area (detailed maps or GPS coordinates showing the boundaries, natural barriers, entry points and host area locations, and, where necessary, buffer zones)
- climate, for example rainfall, relative humidity, temperature, prevailing wind speed and direction.

Further guidance on establishing and describing a PFA is provided in ISPM No. 4 (*Requirements for the establishment of pest free areas*).

2.2 Establishment of the FF-PFA

The following should be developed and implemented:

- surveillance activities for establishment of the FF-PFA
- delimitation of the FF-PFA

- phytosanitary measures related to movement of host material or regulated articles
- pest suppression techniques as appropriate.

The establishment of buffer zones may also be necessary (as described in Section 2.2.1) and it may be useful to collect additional technical information during the establishment of the FF-PFA.

2.2.1 Buffer zone

In areas where geographic isolation is not considered adequate to prevent introduction to or reinfestation of a PFA or where there are no other means of preventing fruit fly movement to the PFA, a buffer zone should be established. Factors that should be considered in the establishment and effectiveness of a buffer zone include:

- pest suppression techniques which may be used to reduce the fruit fly population, including:
 - use of selective insecticide-bait
 - spraying
 - sterile insect technique
 - male annihilation technique
 - biological control
 - mechanical control, etc.
- host availability, cropping systems, natural vegetation, climatic conditions
- the geography of the area
- capacity for natural spread through identified pathways
- the ability to implement a system to monitor the effectiveness of buffer zone establishment (e.g. trapping network).

2.2.2 Surveillance activities prior to establishment

A regular survey programme should be established and implemented. Trapping may be sufficient to determine fruit fly absence or presence in an area for lure/bait responsive species. However, fruit sampling activities may sometimes be required to complement the trapping program especially for species that are non-responsive to specific lures.

Prior to the establishment of a FF-PFA, surveillance should be undertaken for a period determined by the climatic characteristics of the area, and as technically appropriate for at least 12 consecutive months in the FF-PFA using specific trapping and fruit sampling procedures where required in all relevant areas of commercial and non-commercial host plants to demonstrate that the pest is not present in the area. There should be no populations detected during the surveillance activities prior to establishment. A single adult detection, depending on its status (in accordance with ISPM No. 8: *Determination of pest status in an area*), may not disqualify an area from subsequent designation as a FF-PFA. For qualifying the area as a pest free area, there should be no detection of an immature specimen, two or more fertile adults, or an inseminated female of the target species during the survey period. There are different trapping and fruit sampling regimes for different fruit fly species. Surveys should be conducted using the specific guidelines in Appendices 1 and 2. These guidelines may be revised as trap, lure and fruit sampling efficiencies improve.

2.2.2.1 Trapping procedures

This section contains general information on trapping procedures for target fruit fly species. More detailed information, including pest-specific trapping recommendations, is provided in Appendix 1. When planning for trapping, the following should be considered:

Trap type and lures

Several types of traps and lures have been developed over decades to survey fruit fly populations. Fly catches differ depending on the types of lure used. The type of trap chosen for a survey depends on the target fruit fly species and the nature of the attractant. The most widely used traps include Jackson, McPhail, Steiner, open bottom dry trap (OBDT), yellow panel traps, which may use specific attractants (para-pheromone or pheromone lures that are male specific), or food or host odours (liquid protein or dry synthetic). Liquid protein is used to catch a wide range of different fruit fly species and capture both females and males, with a slightly higher percentage of females captured. However identification of the

fruit flies can be difficult due to decomposition within the liquid bait. In traps such as McPhail, ethylene glycol may be added to delay decomposition. Dry synthetic protein baits are female biased, capture less non-target organisms and, when used in dry traps, may prevent premature decomposition of captured specimens.

Trap density

Trap density (number of traps per unit area) is a critical factor for effective fruit fly surveys and it should be designed based on target fruit fly species, trap efficiency, cultivation practices, and biotic and abiotic factors. Density may change depending on the programme phase, with different densities required during the establishment of FF-PFA and the maintenance phase. Trap density also depends on the risk associated with potential points of entry. For surveillance prior to establishment, higher densities are required in commercial production sites and lower densities at points of entry.

Trap deployment (determination of the specific location of the traps)

In a FF-PFA programme, an extensive trapping network should be deployed over the entire area. The trapping network layout will depend on the characteristics of the area, host distribution and the biology of the fruit fly of concern. One of the most important features of trap placement is the selection of a proper location and trap site within the host plant. The application of Global Positioning System (GPS) and geographic information systems (GIS) are useful tools for management of a trapping network.

Trap location should take into consideration the presence of the preferred hosts (primary, secondary and occasional hosts) of the target species. Because the pest is associated with maturing fruit, the location including rotation of traps should follow the sequence of fruit maturity in host plants. Consideration should be given to commercial management practices in the area where host trees are selected. For example, the regular application of insecticides (and/or other chemicals) to selected host trees may have a false-negative effect on the trapping programme.

Trap servicing

The frequency of trap servicing (maintaining and refreshing the traps) during the period of trapping should depend on the:

- longevity of baits (attractant persistency)
- retention capacity
- rate of catch
- season of fruit fly activity
- placement of the traps
- biology of the species
- environmental conditions.

Trap inspection (checking the traps for fruit flies)

The frequency of regular inspection during the period of trapping should depend on:

- expected fruit fly activity (biology of the species)
- response of the target fruit fly in relation to host status at different times of the year
- relative number of target and non-target fruit flies expected to be caught in a trap;
- type of trap used;
- physical condition of the flies in the trap (and whether they can be identified).

In certain traps, specimens may degrade quickly making identification difficult or impossible unless the traps are checked frequently.

Identification capability

NPPOs should have in place, or have ready access to, adequate infrastructure and trained personnel to identify captured specimens of the target species in an expeditious manner, preferably within 48 hours. Continuous access to expertise may be necessary during the establishment phase or when implementing corrective actions.

2.2.2.2 Fruit sampling procedures

With fruit flies that are not responsive to traps, the following factors should be considered if fruit sampling is to be used as a surveillance method. It should be noted that fruit sampling is particularly effective in small-scale delimiting surveys in an outbreak area. However, it is labour-intensive, time consuming and expensive due to the destruction of fruit. It is important that fruit samples should be held in suitable condition to maintain the viability of all immature stages of fruit fly in infested fruit for identification purpose.

Host preference

Fruit sampling should take into consideration the presence of primary, secondary and occasional hosts of the target species. Fruit sampling should also take into account the maturity of fruit, apparent signs of infestation in fruit, and commercial practices (e.g. application of insecticides) in the area.

Focusing on high risk areas

Fruit sampling should be targeted on areas likely to have presence of infested fruits such as:

- urban areas
- abandoned orchards
- rejected fruit at packing facilities
- fruit markets
- sites with a high concentration of primary hosts
- entrance points into the FF-PFA, where appropriate.

The sequence of hosts that are likely to be infested by the target fruit fly species in the area should be used as fruit sampling areas.

Sample size and selection

Factors to be considered include:

- the required level of confidence
- the availability of primary host material in the field
- fruits with symptoms on trees, fallen or rejected fruit (for example at packing facilities), where appropriate.

Procedures for processing sampled fruit for inspection

Fruit samples collected in the field should be brought to a facility for holding, fruit dissection, pest recovery and identification. Fruit should be labeled, transported and held in a secure manner to avoid mixing fruits from different samples.

Identification capability

NPPOs should have in place, or have ready access to, adequate infrastructure and trained personnel to identify fruit fly immature stages and emerged adults of the target species in an expeditious manner.

2.2.3 Controls on the movement of regulated articles

Movement controls of regulated articles should be implemented to prevent the entry of target pests into the FF-PFA. These controls depend on the assessed risks (after identification of likely pathways and regulated articles) and may include:

- listing of the target fruit fly species on a quarantine pest list
- regulation of the pathways and articles that require control to maintain the FF-PFA
- domestic restrictions to control the movement of regulated articles into the FF-PFA
- inspection of regulated articles, examination of relevant documentation as appropriate and, where necessary for cases of non-compliance, the application of appropriate phytosanitary measures (e.g. treatment, refusal or destruction).

2.2.4 Additional technical information for establishment of a FF-PFA

Additional information may be useful during the establishment phase of FF-PFAs. This includes:

- historical records of detection, biology and population dynamics of the target pest(s), and survey activities for the designated target pest(s) in the FF-PFA

- the results of phytosanitary measures taken as part of actions following detections of fruit flies in the FF-PFA
- records of the commercial production of host crops in the area, an estimate of non-commercial production and the presence of wild host material
- lists of the other fruit fly species of economic importance that may be present in the FF-PFA.

2.2.5 Domestic declaration of pest freedom

The NPPO should verify the fruit fly free status of the area (in accordance with ISPM No. 8: *Determination of pest status in an area*) specifically by confirming compliance with the procedures set up in accordance with this standard (surveillance and controls). The NPPO should declare and notify the establishment of the FF-PFA, as appropriate.

In order to be able to verify the fruit fly free status in the area and for purposes of internal management, the continuing FF-PFA status should be checked after the PFA has been established and any phytosanitary measures for the maintenance of the FF-PFA have been put in place.

2.3 Maintenance of the FF-PFA

In order to maintain the FF-PFA status, the NPPO should continue to monitor the operation of the surveillance and control activities, continuously verifying the pest free status.

2.3.1 Surveillance for maintenance of the FF-PFA

After verifying and declaring the FF-PFA, the official surveillance programme should be continued at a level assessed as being necessary for maintenance of the FF-PFA. Regular technical reports of the survey activities should be generated (for example monthly). Requirements for this are essentially the same as for establishment of the FF-PFA (see Section 2.2) but with differences in density and trap locations dependent upon the assessed level of risk of introduction of the target species. In this case (i.e. surveillance for maintenance), lower densities are required in commercial production sites, and higher densities at entrance points and in other high risk areas.

2.3.2 Controls on the movement of regulated articles

These are the same as for establishment of the FF-PFA (provided in Section 2.2.3).

2.3.3 Corrective actions (including response to an outbreak)

The NPPO should have prepared plans for corrective actions that may be implemented if the target pest(s) is detected in the FF-PFA or in host material from that area, or if faulty procedures are found (detailed guidelines are provided in Annex 1). This plan should include components or systems to cover:

- outbreak declaration according to criteria in ISPM No. 8 (*Determination of pest status in an area*) and notification
- delimiting surveillance (trapping and fruit sampling) to determine the infested area under corrective actions
- implementation of control measures
- further surveillance
- criteria for the reinstatement of freedom of the area affected by the outbreak
- responses to interceptions.

A corrective action plan should be initiated as soon as possible and in any case within 72 hours of the detection (of an adult or immature stage of the target pest).

2.4 Suspension, reinstatement or loss of a FF-PFA status

2.4.1 Suspension

The status of the FF-PFA should be suspended when an outbreak of the target pest occurs or based on one of the following triggers: detection of an immature specimen, two or more fertile adults or an inseminated female within a defined period. Suspension may also be applied if procedures are found to be faulty (for example inadequate trapping, host movement controls or treatments).

If the criteria for an outbreak are met, this should result in the implementation of the corrective action plan as specified in this standard and immediate notification to interested importing countries' NPPOs (see ISPM No. 17: *Pest reporting*). The whole or part of the FF-PFA may be suspended or revoked. Where a suspension is put in place, the criteria for lifting the suspension should be made clear. Interested importing countries' NPPOs should be informed of any change in FF-PFA status.

2.4.2 Reinstatement

Reinstatement may take place:

- in the case of detection of a fruit fly outbreak, only after having no further detection for at least three life cycles or at least 12 consecutive months, whichever is shorter, or when the conditions for establishment of the FF-PFA have again been achieved;
- in case of a fault in the procedures, only when the fault has been corrected.

2.4.3 Loss of FF-PFA status

If the control measures are not effective and the pest becomes established in the whole area (the area recognized as pest free), the status of the FF-PFA should be lost. In order to achieve again the FF-PFA, the procedures of establishment and maintenance outlined in this standard should be followed.

ANNEX 1

GUIDELINES ON CORRECTIVE ACTION PLANS

The detection of a single fruit fly (adult or immature) of the target species in the FF-PFA should trigger enforcement of a corrective action plan.

In case of an outbreak, the objective of the corrective action plan is to ensure eradication of the pest to enable reinstatement of pest status in the affected area into the FF-PFA.

The corrective action plan should be prepared taking into account the biology of the target fruit fly species, the geography of the FF-PFA area, climatic conditions and host distribution within the area.

The elements required for implementation of a corrective action plan include:

- legal framework under which the corrective action plan can be applied
- criteria for the declaration of an outbreak
- time scales for the initial response
- technical criteria for delimiting trapping, fruit sampling, application of the eradication actions and establishment of regulatory measures
- availability of sufficient operational resources
- identification capability
- effective communication within the NPPO and with the NPPO (s) of the importing country(s), including provision of contact details of all parties involved.

Actions to apply the corrective action plan**1. Determination of the phytosanitary status of the detection (actionable or non actionable)**

1.1. If the detection is a transient non actionable occurrence (ISPM No. 8: *Determination of pests status in an area*), no further action is required.

1.2. If the detection of a target pest may be actionable, a delimiting survey, which includes additional traps, and usually fruit sampling as well as an increased trap inspection rate, should be implemented immediately after the detection to assess whether the detection represents an outbreak, which will determine necessary responsive actions. If a population is present, this action is also used to determine the size of the affected area.

2. Suspension of FF-PFA status

If after detection it is determined that an outbreak has occurred or any of the triggers specified in Section 2.4.1 is reached, the FF-PFA status in the affected area should be suspended. The affected area may be limited to parts of the FF-PFA or may be the whole FF-PFA.

3. Implementation of control measures in the affected area

As per ISPM No. 9 (*Guidelines for pest eradication programmes*), specific corrective or eradication actions should be implemented immediately in the affected area(s) and adequately communicated to the community. Eradication actions may include:

- selective insecticide-bait treatments
- sterile fly release if required
- total harvest of fruit in the trees
- male annihilation technique
- destruction of infested fruit
- soil treatment (especially in urban areas).

Phytosanitary measures should be immediately enforced, including cancellation of shipments of fruit commodities from the affected area and operation of road blocks to prevent the movement of infested fruit from the affected area to the rest of the pest free area, as appropriate. Other measures could be adopted if agreed by the importing country, for example treatment, increased surveys, supplementary trapping.

4. Criteria for reinstatement of a FF-PFA after an outbreak and actions to be taken

The criteria for determining that eradication has been successful should be based on having no further detection for at least three life cycles of the target pest species, or one year without detection. The time period will depend on the biology of the species and the prevailing environmental conditions. Once the criteria have been fulfilled the following actions should be taken:

- notification of NPPOs of importing countries
- reinstatement of normal surveillance levels
- reinstatement of the FF-PFA.

5. Notification of relevant agencies

Pertinent NPPOs and other agencies should be kept informed at all times as appropriate, and IPPC pest reporting obligations observed (ISPM No. 17: *Pest reporting*).

APPENDIX 1

This appendix is for reference purposes only and is not a prescriptive part of the standard. The publication below is widely available, easily accessible and generally recognized as authoritative.

GUIDELINES ON TRAPPING PROCEDURES

Until the new ISPM “Trapping procedures for fruit flies of the family Tephritidae” is provided, information about trapping is available in the following of the International Atomic Energy Agency (IAEA): *Trapping Guidelines for area-wide fruit fly programmes*, IAEA/FAO-TG/FFP, 2003. IAEA, Vienna.

APPENDIX 2

GUIDELINES FOR FRUIT SAMPLING

1. Background

In fruit fly control programmes, fruit sampling is a pertinent method used to help assess the age structure of a fruit fly population, host sequence and seasonal abundance. It is also used as a detection tool during eradication.

In programmes using sterile insect technique, fruit sampling plays a predominant role as the most reliable method for determining the occurrence of the target pest and for evaluating the effectiveness of the control measures applied.

In sterile fly release areas, fruit sampling relegates trapping to a second place, especially due to the likelihood of error in adult identification through the capture of hundreds of thousands of sterile flies.

Under certain conditions, fruit sampling can provide better information than trapping for delimitation of established wild populations, although in fly-free areas it is less efficient in detecting newly introduced populations. However, it can complement trapping by confirming the presence and/or establishment of a population and by providing information on the magnitude of an outbreak.

Fruit sampling is also a necessary tool to identify the hosts of fruit fly species, in case the fly is a lesser-known species or if a fruit fly outbreak occurs in a new geographic area. As fruit flies are highly adaptive, they can change their choice of host plants, and this can only be detected through the collection of fruits.

2. Scope

The fruit sampling procedures in this document cover the different phases of a programme and may be used to develop fruit fly pest free areas (FF-PFAs), from pre-suppression/eradication activities to establishment of the area. However, relevant to this standard are only those sampling procedures applied as part of the certification process during the establishment of a FF-PFA. Fruit sampling during maintenance of the FF-PFA is applied as part of a corrective action plan; thus it is not described in this document.

3. Fruit Sampling Objectives

The objective of fruit sampling at the initial stages (pre-eradication) of an area-wide control programme is to produce baseline information (Table 1). The information includes primary, secondary and occasional hosts of fruit flies in the area, as well as the phenology and distribution of the respective hosts in the area under consideration. It may also provide information on the pest's host range, host sequence and fruit fly population structure.

During the suppression and eradication phases, fruit sampling becomes an evaluation tool of the control activities by measuring fruit infestation levels. During the post-eradication phase (certification) and fly-free phase (maintenance), fruit sampling becomes a detection tool (Table 1). Primary hosts are collected in the most sensitive geographical areas. The responsibilities of field sampling end with the delivery of the collected samples to the fruit-processing laboratory. The purpose of the laboratory is to study the fruit samples by processing the fruits to rear fruit fly larvae to the adult stage for easy identification, or to dissect the fruit and identify larvae if capabilities for species identification at the larval stage exist.

Table 1. Fruit sampling applications related to the programme objective and operational phase

Fruit sampling application	Objective	Programme phase
General fruit sampling	Baseline information	Pre-eradication
Systematic fruit sampling	Evaluation of suppression	Suppression
Systematic fruit sampling	Evaluation of eradication	Eradication
Selective fruit sampling	Certification of FF-PFA	Post-eradication
Corrective action plan	Maintenance	Fruit fly free area

4. Fruit Sampling Methods and Procedures

There are basically three sampling applications that are dependant of the objective and programme phase (Table 1): general sampling, systematic sampling and selective sampling.

4.1 General sampling

General sampling consists of collecting, throughout the year, the widest range of fruits that could be infested by fruit flies with no special emphasis on a particular fruit. This type of sampling provides mainly qualitative information and is of fundamental importance.

The primary objective of this type of sampling is to identify true hosts in the area and to determine host susceptibility, host range and infestation gradients. Because this fruit sampling is done extensively throughout the year it also provides information on host distribution, density and phenology. All this information is used for proper planning of year round fruit sampling activities.

During the preparation stage of a programme, such as for an eradication campaign, this sampling has to be carried out for at least one year so that it can provide information regarding the different phenological stages of the fruit hosts. This sampling can be considered completed when sufficient information on relative abundance, temporal and spatial distribution of the pest has been obtained. This should precede the start of eradication actions, during which the systematic fruit sampling is enforced. The general sampling is extensive by nature and only small amounts of fruit sampling are collected. Fruit samples have to be continuously collected with a time interval of 14 days from the entire area throughout the year (Table 2). For number of samples and kilograms per unit surface, see Table 3.

Table 2. Fruit sampling frequencies

Fruit sampling application	Interval (days)
General fruit sampling	14
Systematic fruit sampling	7 to 14
Selective fruit sampling	7
Corrective action plan	1 to 3

Table 3. Fruit sampling levels per km²

Programme Phase	Fruit orchards		Urban and suburban areas		Other areas with scattered hosts	
	samples ¹	kg ¹	samples	kg	samples	kg
Pre-eradication	3	6	2	4	1	2
Suppression (chemical control)	4	8	3	6	2	4
Eradication (autocidal control)	6	12	5	10	4	8
Post-eradication	10	20	9	18	8	16
Fly free area	Only applied as a result of an adult detection as part of the corrective action plan.					

¹Average figures used in operational programmes

4.2 Systematic sampling

This type of sampling is based on information produced by the general sampling and is carried out in areas subjected to control procedures during the suppression/eradication phase.

The objective of this sampling is to keep a close and systematic surveillance on wild fly populations. One of its features is that it uses a selective, hierarchical procedure for the known hosts, based on the degree of preference. In this way, for sampling, priority is given to the most preferred hosts (primary hosts) and secondly only to other hosts considered to be secondary or occasional hosts. If there are no known hosts at the sampling location, any type of fruit that potentially can be infected by fruit flies can be collected. Fruit samples have to be continuously

collected with a time interval of 7 to 14 days from the entire area throughout the year (Table 2).

This type of fruit sampling is much more intensive than the general sampling. For number of samples and kilograms per unit surface see Table 3.

4.3 Selective sampling

This sampling focuses on the collection of the preferred host(s) during the maturation season. Fruits may be collected from hosts identified from information from other countries dealing with the same fruit fly species and having similar ecological conditions. Preferred hosts are sometimes called “trap-hosts”, since the likelihood of detecting the pest is high even when populations are at low levels. This type of sampling is carried out during the post-eradication phase, in areas where the eradication status is being verified, as part of the certification process. Fruit samples have to be collected from the selected crops and sites every 7 days during the fruit maturation period (Table 2). For number of samples and kilograms per unit surface see Table 3.

During the maintenance phase, fruit sampling is not conducted on a continuous basis in the pest free area. In this case selective fruit sampling activities will be implemented after the detection of an adult in a trap. This is explained in more detail in Annex 1 on corrective action plans.

Special emphasis should be placed on markets and packing facilities where fruits are selected and eliminated when damaged, given the high degree of preference for these hosts. Selective sampling can also be carried out on trap-host(s) especially during the time when the host trees are bearing a small number of fruits (at the beginning and/or at the end of the fruiting season). This greatly increases the probability of detecting the pest. If the trap-crop is industrially processed or packed within the sampling area, it is better to take samples directly from the processing and packing centers. In this case a set statistical fruit sampling is conducted on each fruit load during the selection process. Generally, fruit that does not satisfy quality standards is discarded and sold in the domestic market or disposed and can be used for sampling purposes, substantially increasing the probabilities of detecting the pest. The origin of this fruit can be traced back to the field where the fruit was harvested by consulting the records of the fruit load. Records should be maintained at all times by the personnel at the packing facility and presented upon request.

In case trap-crops are of commercial value for low-income families, purchase of this fruit is advisable. Confiscation of such fruit through phytosanitary regulations, even in small amounts, can cause social problems and damage the public image and acceptability of the campaign.

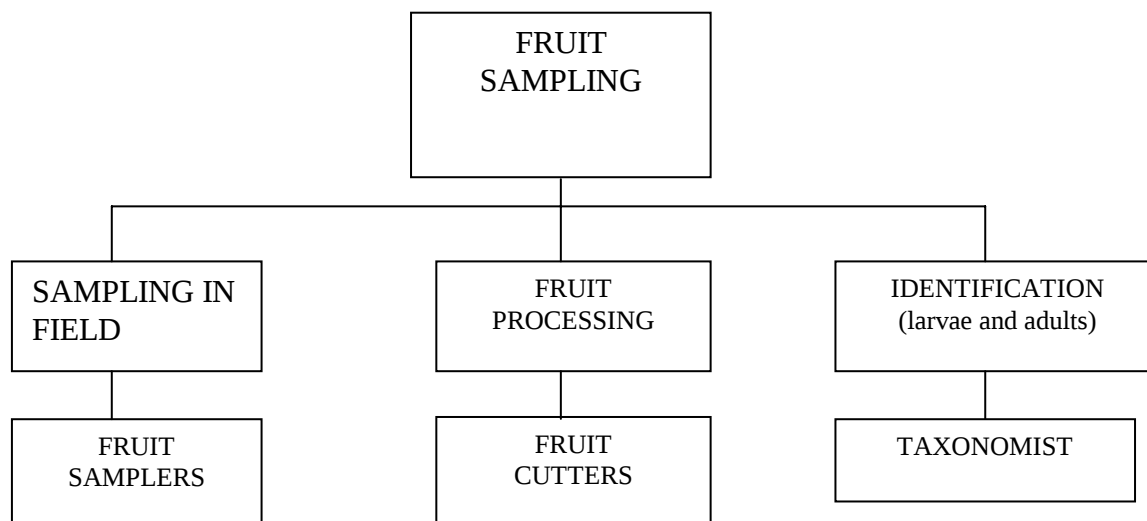
5. Fruit Sampling Procedures

5.1 Division of sampling area and location of sampling sites

It is of fundamental importance to establish an effective method to divide the sampling area for easy location of the sampling sites. Using maps of preferably a scale of 1:50,000 the sampling area is divided into quadrants of 10×10 km (or 100 km^2) following international coordinates used in conventional cartography. The quadrant is in turn subdivided into four sub quadrants. A thorough inspection for determination of likely sites for fruit sampling within the sub quadrant needs to be conducted. Some parameters used to determine sites are the importance of the pest, the density of hosts, the density of the pest, the fruit load on plants. Once sampling sites are identified, they need to be geo-referenced. The availability of the Global Positioning System (GPS) greatly facilitates determination of geographical coordinates for identification of sampling sites. The identification number of each site is used for record keeping, feeding databases and easy location of the site in case of the detection of an immature stage of the pest.

5.2 Organization

Fruit sampling can be done together with trapping activities in the case of systematic fruit sampling. However it can also be a separate activity in a programme. Fruit sampling does not necessarily follows the trapping routes especially in the case of general and selective fruit sampling. An example of a practical organizational structure for fruit sampling activity in operational programmes is presented in Figure 1.

Figure 1. Organizational/procedural structure of the fruit sampling section:

5.3 Fruit collection procedures

To start a sampling programme the following information is important:

- infra structure and topography of the area (visit area, maps)
- biology and ecology of the pest
- phenology of the wild and cultivated hosts, and their occurrence
- composition of the vegetation
- fruit marketing centers, fruit growing areas, packing facilities.

Sampling should be done in the entire area. Samples are not to be taken at random but on the basis of certain technical criteria and empirical knowledge. The available information on the biology and habits of the fly, damage symptoms, as well as pest population levels and distribution should be used.

Fruit should not be collected in plastic bags. Although this is easily available, it might cause the larvae to die due to heat, shortage of oxygen or simply by drowning in the fruit juice in the bag.

Equipment for fruit collection includes:

- suitable means of transportation
- fruit bags preferably made of cotton or fruit holding boxes, either plastic or polyethurane (the latter material will protect the fruit from heat)
- fruit cutter to collect fruits from the tree
- labels with information on date, quadrant, sub quadrant, GPS position as WPT (Way point), common name of host, number of fruits, kilograms and name of technician
- screen to cover the boxes (some fruit fly larvae jump; and for boxes with low sides, larvae can end up in another sample by just jumping)
- absorbent material to place in the boxes under the fruit (this will absorb the juice coming out of the fruit, so the fruit fly larvae will not drown)
- recording sheet and maps of the area
- GPS equipment.

Samples can be collected either from the ground or from the tree. In the case of fruit collected from the ground, only recently fallen fruits should be collected as fruit fly larvae might have already left the fruits to pupate in the soil.

The size of a sample can vary widely. This will depend on availability and volume of the fruit sampled. It can range from 0.5 kg in the case of coffee berries to 5 kg in case of a larger fruit like grapefruit. Excessive sample sizes should be avoided, as they will make farmers or property owners unsatisfied with the programme.

Each sample should be properly labeled. The data on the label should be such that the original location of the fruits can easily be retraced in case the fruits are infested with the target fruit fly.

Fruit sampling can also give information on the fruit fly parasitism rate in that area, as on infestation by other fruit fly species.

In an eradication programme, where the fruit flies species occurs in low numbers, fruit sampling should be focused on the primary hosts. Damaged fruits of those fruit species should be selectively preferably sampled. Fruit should be collected ripe. Fruit maturity and the development of eggs and larvae in the fruit are often in synchrony. Females select fruits with a suitable degree of ripeness in order for the offspring to complete its development. Unripe fruits should not be collected.

6. Processing of samples for inspection

After the fruit samples are brought in, there are two ways to process it.

6.1 Fruit cutting

Each fruit is cut for careful observation. Each fruit is dissected on the basis of its color and consistency, which is related to the degree of ripeness. The development of the larvae is closely related to the fruit ripeness. The person dissecting the fruit should be well trained to recognize larvae in infested fruit, as well as distinguishing between Diptera larvae and larvae of other insect orders, such as Lepidoptera and Coleoptera. The larvae are placed in separate vials containing water or appropriate preservative, labeled with their respective sample number, and then sent to the taxonomist. The person dissecting fruits should take a 15-30 minutes break after 2-3 hours of work in order to reduce or avoid possible errors.

6.2 Fruit holding and maturing

Fruit holding and maturing is the process in which whole or cut fruit is placed in a container to allow for further ripening, so that the fruit fly larvae get a chance to mature and pupate. This is the easiest method to determine the identity of the fruit fly species present and/or the parasitism rate of fruit flies. The time needed for the fruit to be stored, so as to have good fly emergence, depends on the fruit species and on the fruit fly in question.

Equipment for fruit holding includes:

- fruit holding boxes with screens on the side and top for ventilation either wooden plastic or polyethurane (this last material will protect the fruit from heat)
- absorbent material to place in the boxes under the fruit (this will absorb the juice coming out of the fruit, so the fruit fly larvae will not drown)
- appropriate preservatives
- plastic or metallic trays for fruit dissection
- other material (entomological tweezers, glass vials, labels, etc)
- data sheets.

Fleshy and thin skin fruits, such as guava, cherry and mango, ripen quickly so they are kept 5 to 10 days, in order for all larvae to pupate. Fruits with more persistent skin like citrus may have to be stored for as long as 15 days, before larvae are mature enough to emerge and pupate.

During the rainy season or under high relative humidity in the tropics, the fruits can be treated with a 2-5% sodium benzoate solution (one-minute submergence) in order to slow down the development of saprophytic microorganisms (i.e. fungi and bacteria).

The type of container will depend on the size of the fruit sample. Jars may be used in case of small fruits/samples; but for bigger samples, plastic trays should be used.

The bottom of the container should be covered by a medium suitable for pupation and able to absorb excessive moisture from the fruits. The medium used can be sawdust, sterilized sand or vermiculite.

Inside the container, a mesh wire screen can be placed several centimeters above the medium, which will hold the fruit, but will allow the larvae to pass through to pupate in the medium.

The containers should be covered with a fine screen or a cloth to keep out the vinegar flies, *Drosophila* species.

Each container should have a unique serial number in order that any information pertaining to infestation, as well as emerging flies and/or parasitoids can be recorded accordingly in a fruit control data sheet. All emerging flies, pupae, pupal case and/or parasitoids are placed in vials together with the respective sample number and should be sent to a professional taxonomist for identification.

6.3 Concentrated solution gradients

This technique is based on the principle of the density difference between the concentrated solution and the larvae, whereby the larvae rise to the surface. For example, in the case of the blueberry maggot, a brown-sugar solution is used to remove larvae from blueberries. The procedure involves gently crushing the fruit in a large container. A concentrated solution, consisting of sugar dissolved in a specified volume of water, is added, to cover the crushed fruit with solution. The mixture is agitated in the solution and any larvae present rise to the surface and can be detected.

7. Record Keeping

In order to use the results of the fruit collection in an optimal way, as much information as possible should be written down. An example of an information sheet is given in Table 4.

The following information is recommended:

- date of collection
- location, street or field number, preferably locations taken with GPS
- fruit species, variety
- number of fruits and weight
- name of collector/identifier of the fruit samples
- results, i.e. number and species of flies, pupae, parasitoids, etc.

Routine analysis of the information should be conducted. Information should be kept updated.

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- IV Chemical control.

Table 4. Example of fruit collection records in year 2003

2003									
sample number	longitude	latitude	date	fruit species	location	district	number	weight	date of check + results
							of fruits	in grams	
F 12526	-55.10595087	5.86223698	6/1/03	carambola	Paramaribo		2	372	3/2=no infestation
F 12527	-55.62862715	5.841094919	8/1/03	rose apple	Saramacca	Damboentong	11	193	3/2=no infestation
F 12528	-55.58593081	5.83407332	8/1/03	carambola	Saramacca	Damboentong	5	400	3/2=1 pupa
F 12531	-55.48453937	5.79828613	8/1/03	carambola	Saramacca	Groningen	5	355	3/2=48 Bactrocera+13 pupae
F 12560	-55.08172272	5.18207252	17/1/03	Eugenia prob. Florida	Brokopondo	Klaaskreek	8	55	3/2=2 Anastrepha
F 12595	-55.1469525	5.7449643	29/1/03	carambola	Para	Highway	6	250	12/2=143 Bactrocera+1 Anastrepha+4 pupae
F 12596	-55.11198068	5.70446292	30/1/03	carambola	Wanica	Highway	5	197	12/2=322 Bactrocera+10 pupae
F 12597	-55.16388863	5.7718052	30/1/03	carambola	Wanica	Dijkveld	5	274	12/2=47 Bactrocera+14 pupae
F 12598	-55.10202985	5.70135973	30/1/03	carambola	Para		5	227	12/2=64 Bactrocera+4 pupae
F 12608	-55.50315199	5.42135882	4/2/03	mispel (small)	Para	Poika	13	24	17/2=no infestation
F 12609	-55.50492762	5.41689022	4/2/03	hogplum	Para	Poika	17	255	25/2=30 Anastrepha+24 parasites+16 pupae
F 12610	-55.51018242	5.41329199	4/2/03	hogplum	Para	Poika	14	224	17/2=no infestation
F 12611	-55.34452584	5.24771448	4/2/03	hogplum	Para	Kwakoegron	15	120	28/2=10 Anastrepha+18 parasites+1 pupa
F 12612	-55.32295884	5.45170492	4/2/03	carambola	Para	Matta	3	125	17/2=no infestation
F 12613	-55.58000835	5.83709509	4/2/03	rose apple	Saramacca	Catharina Sophia	6	183	25/2=14 Bactrocera+4 pupae
F 12614	-55.54230608	5.82701649	4/2/03	rose apple	Saramacca	Catharina Sophia	10	352	17/2=no infestation
F 12615	-55.51820432	5.80285045	4/2/03	rose apple	Saramacca	Damboentong	6	125	17/2=no infestation
F 12616	-55.48952377	5.79379352	4/2/03	rose apple	Saramacca	Groningen	10	205	28/2=no infestation
F 12617	-55.58679609	5.82778764	4/2/03	carambola	Saramacca	Damboentong	8	525	17/2=no infestation
F 12618	-55.48382902	5.80563027	4/2/03	West-Indian cherry	Saramacca	Groningen	15	125	17/2=no infestation
F 12619	-55.58818318	5.82804555	4/2/03	carambola	Saramacca	Catharina Sophia	5	660	17/2=no infestation
F 12620	-55.54881544	5.82246134	4/2/03	Syzygium sp.	Saramacca	Catharina Sophia	6	65	17/2=no infestation

**INTERNATIONAL STANDARDS FOR
PHYTOSANITARY MEASURES**

DIAGNOSTIC PROTOCOLS FOR REGULATED PESTS

Secretariat of the International Plant Protection Convention
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, ----

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Main elements of the procedure for the development of diagnostic protocols

INTRODUCTION

SCOPE

This standard provides guidance on the structure and content of the International Plant Protection Convention (IPPC) diagnostic protocols for regulated pests. The protocols describe procedures and methods for the official diagnosis of regulated pests that are relevant for international trade. They provide at least the minimum requirements for reliable diagnosis of regulated pests.

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DEFINITIONS

At its Seventh session in April 2005, the Interim Commission on Phytosanitary Measures adopted recommendations on the publication of ISPMs in a book format (see ICPM-7 report, paragraph 39 and Appendix II). This will contain a glossary chapter, i.e. the *Glossary of phytosanitary terms* (ISPM No. 5) in the relevant language.

The "definitions" section in the present ISPM, once integrated into the book, will not contain any definitions but will refer to the Glossary chapter of the book (ISPM No. 5). However, for the purpose of country consultations, this section contains terms or definitions which are new or revised in the present draft standard. Once this standard has been adopted, the new and revised terms and definitions will be transferred into the Glossary chapter of the book (ISPM No. 5), and will not appear in the standard itself.

New terms and definitions

pest diagnosis	The process of detection and identification of a pest.
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OUTLINE OF REQUIREMENTS

This standard sets the framework for the content of diagnostic protocols, their purpose and use, their publication and their development. Diagnostic protocols for specific regulated pests are included as annexes to this standard.

Information relevant for diagnosis is provided in the diagnostic protocol on the specified regulated pest, its taxonomic position, and the methods to detect and identify it. Diagnostic protocols contain the minimum requirements for reliable diagnosis of the specified regulated pests and provide flexibility to ensure that methods are appropriate for use in the full range of circumstances. The methods included in diagnostic protocols are selected on the basis of their sensitivity, specificity and reproducibility, and information related to these factors is provided for each of these methods.

Detailed information and guidance for the detection of pests is provided on, for example, signs and/or symptoms associated with the pest, illustrations (where appropriate), developmental stages of the pest, and methods for detecting the pest in a commodity, as well as methods for extracting, recovering and collecting the pests from plants. Information and guidance for the identification of pests includes detailed information on morphological and morphometric methods, methods based on biological properties, and methods based on biochemical and molecular properties of the pest. Furthermore detailed guidance is provided on the records that should be kept.

Diagnostic protocols are intended to be used by laboratories performing pest diagnosis as part of phytosanitary measures. They are subject to review and amendment to take into account new developments in pest diagnosis. The standard also provides guidance on how these protocols will be initiated, developed, reviewed and published.

BACKGROUND

Proper pest detection and pest identification are crucial for the appropriate application of phytosanitary measures (see for example ISPM No. 4: *Requirements for the establishment of pest free areas*; ISPM No. 6: *Guidelines for surveillance*; ISPM No. 7: *Export certification system*; ISPM No. 9: *Guidelines for pest eradication programmes*; and ISPM No 20: *Guidelines for a phytosanitary import regulatory system*). In particular, contracting parties need proper diagnostic procedures for determination of pest status and pest reporting (ISPM No. 8: *Determination of pest status in an area*; ISPM No. 17: *Pest reporting*), and the diagnosis of pests in imported consignments (ISPM No. 13: *Guidelines for the notification of non-compliance and emergency action*).

National Plant Protection Organizations (NPPOs) have produced diagnostic protocols for regulated pests in order to adequately fulfil responsibilities according to Article IV of the IPPC (1997), in particular regarding surveillance, import inspections and export certification. In response to the need for regional harmonization, several Regional Plant Protection Organizations (RPPOs) have developed a significant number of regional diagnostic standards. This underlines the need for international harmonization, and those national and regional standards may form the basis for international protocols. Subsequently, the ICPM, at its Sixth session in 2004, recognized that there was a need for international diagnostic protocols within the framework of the IPPC and approved the formation of a Technical Panel on Diagnostic Protocols (TPDP) for that purpose.

PURPOSE AND USE OF DIAGNOSTIC PROTOCOLS

The purpose of harmonized diagnostic protocols is to support efficient phytosanitary measures in a wide range of circumstances and to enhance the mutual recognition of diagnostic results by NPPOs, which may also facilitate trade. Furthermore these protocols should aid the development of expertise and technical cooperation, and they may also be relevant to the accreditation and/or approval of laboratories.

Diagnostic protocols describe procedures and methods for the detection and identification of regulated pests that are relevant to international trade.

Diagnostic protocols may be used in different circumstances that may require methods with different characteristics. Examples of such circumstances grouped according to an increased need for high sensitivity, specificity and reliability are:

- routine diagnosis of a pest widely established in a country
- general surveillance for pest status
- testing of material for compliance with certification schemes
- surveillance for latent infection by pests
- surveillance as part of an official control or eradication programme
- pest diagnostic associated with phytosanitary certification
- routine diagnosis for pests found in imported consignments
- detection of a pest in an area where it is not known to occur
- cases where a pest is identified by a laboratory for the first time
- detection of a pest in a consignment originating in a country where the pest is declared to be absent.

In the case of routine diagnosis, the speed and cost of a test method may be more relevant than sensitivity or specificity. However, the identification of a pest by a laboratory or in an area for the first time may require methods with a high level of specificity and reproducibility. The significance of the outcome of a diagnosis is often dependent on proper sampling procedures. Such procedures are addressed by other ISPMs (under preparation).

Diagnostic protocols provide the minimum requirements for reliable diagnosis of regulated pests. This may be achieved by a single method or a combination of methods. Diagnostic protocols also provide additional methods to cover the full range of circumstances for which a diagnostic protocol may be used. The level of sensitivity, specificity and reproducibility of each method is indicated where possible. NPPOs may use these criteria to determine the method or combination of methods that are appropriate for the relevant circumstances.

Diagnostic protocols are intended to be used by laboratories performing pest diagnosis. Such laboratories may be established under or may be authorized by the NPPO to perform these activities in such manner that the results of the pest diagnosis may be considered as part of a phytosanitary measure of the NPPO.

The main elements of the procedure for the development of diagnostic protocols are presented in Appendix 1.

REQUIREMENTS

1. General Requirements for Diagnostic Protocols¹

Each protocol contains the methods and guidance necessary for the regulated pest(s) to be detected and positively identified by an expert (i.e. an entomologist, mycologist, virologist, bacteriologist, nematologist, weed-scientist, molecular biologist) or competent staff that are specifically trained.

The methods included in diagnostic protocols are selected on the basis of their sensitivity, specificity and reproducibility. In addition, the availability of equipment, the expertise required for these methods and their practicability (for example ease of use, speed and cost) are taken into account when selecting methods for inclusion in the diagnostic protocol. Usually these methods and their associated information should also be published. It may be necessary that some methods are validated before inclusion in the protocols. Such validation may include, for example, the use of a proficiency panel to analyze known samples to verify sensitivity, specificity and reproducibility. Each diagnostic protocol usually describes more than one method to take into account the capabilities of laboratories and the situations for which the methods are applied. Such situations include diagnosis of different developmental stages of organisms, which require different methodologies, the need for an alternative diagnostic technique because of uncertainties of the initial diagnosis, as well as the level of sensitivity, specificity and reliability required by NPPOs. For some purposes a single method may be sufficient, for other purposes a combination of methods may be necessary. Each protocol contains introductory information, information on the taxonomic position of the pest, methods

¹ The following general provisions apply to all diagnostic protocols:

- Laboratory tests may involve the use of chemicals or equipment which present a certain hazard. In all cases, national safety procedures should be strictly followed;
- Use of names of chemicals or equipment in these diagnostic protocols implies no approval of them to the exclusion of others that may also be suitable;
- Laboratory procedures presented in the protocols may be adjusted to the standards of individual laboratories, provided that they are adequately validated.

for detection and identification of the pest, records to be kept, and references to appropriate scientific publications. In many cases a wide range of supplementary information is available which may support diagnosis, for example geographical distribution of the pest and host lists, but diagnostic protocols focus on the critical methods and procedures for pest diagnosis.

The aspects of quality assurance and in particular the reference materials that are required by diagnostic protocols (such as inclusion of positive and negative controls or collection of specimens) are specifically indicated in the corresponding section of the protocol.

2. Specific Requirements for a Diagnostic Protocol

2.1 Structure of diagnostic protocols

Diagnostic protocols are arranged according to the following sections:

- Pest information
- Taxonomic information
- Detection
- Identification
- Records
- Contact points for further information
- Acknowledgements
- References.

2.2 Pest information

Brief information is provided on the pest, including, where appropriate, its life cycle, morphology, variation (morphological and/or biological), relationship with other organisms, host range (in general), effects on hosts, present and past geographical distribution (in general), mode of transmission and dissemination (vectors and pathways). When available, reference to a pest data sheet should also be provided.

2.3 Taxonomic information

This section provides information on the taxonomy of the pest involved and includes:

- name (current scientific name, author and year (for fungi, teleomorph name if known))
 - synonyms (including former names)
 - accepted common names, anamorph name of fungi (including synonyms)
 - acronym of viruses and viroids
- taxonomic position (including information on subspecies classifications where relevant).

2.4 Detection

This section of the diagnostic protocol provides information and guidance on:

- the plants, plant products or other articles capable of harbouring the pest
- the signs and/or symptoms associated with the pest (characteristic features, differences or similarities with signs and/or symptoms from other causes), including illustrations, where appropriate
- the part(s) of the plant, plant products or other articles on/in which the pest may be found
- the developmental stages of the pest that may be detected, together with their likely abundance and distribution on/in the plants/plant products or other articles
- the likely occurrence of the pest associated with developmental stages of the host(s), climatic conditions and seasonality
- methods for detecting the pest in the commodity (e.g. visual, hand lens)
- methods for extracting, recovering and collecting the pest from the plants, plant products or other articles, or for demonstrating the presence of the pest in the plants, plant products or other articles
- methods for indicating the presence of the pest in asymptomatic plant material or other materials (e.g. soil or water), such as ELISA² tests or culturing on selective media
- viability of the pest.

² Enzyme-Linked Immunosorbent Assay

For all the methods included in this section, information is provided on their sensitivity, specificity and reproducibility, where relevant. Where appropriate, guidance is provided on positive and negative controls and reference material to be included in tests. Guidance is also provided on resolving possible confusion with similar signs and/or symptoms due to other causes.

2.5 Identification

This section provides information and guidance on methods that either used alone or in combination lead to the identification of the pest. When several methods are mentioned, their advantages/disadvantages are given as well as the extent to which the methods or combinations of methods are equivalent. A flow diagram may be presented if several methods are needed to identify the pest or many alternative methods are included.

Main types of methodologies used in diagnostic protocols include those based on morphological and morphometric characteristics, biological properties such as virulence or host range of a pest, and those based on biochemical and molecular properties. Morphological characteristics may be investigated directly or after culturing or isolation of the pest. Culturing and/or isolation may also be required for biochemical and/or molecular assays. Details are provided when culturing or isolation procedures are necessary components of methods.

For morphological and morphometric identifications, details are provided, as appropriate, on:

- methods to prepare, mount and examine the pest (such as for light microscopy, electron microscopy and measurement techniques)
- identification keys (to family, genus, species)
- descriptions of the morphology of the pest or of its colonies, including illustrations of morphological diagnostic characteristics, and an indication of any difficulties in seeing particular structures
- comparison with similar or related species
- relevant reference specimens or cultures.

For biochemical or molecular identifications, each method (e.g. serological methods, BIOLOG³, electrophoresis, PCR⁴, TaqMan⁵, DNA barcoding, RFLP⁶, DNA sequencing) is described separately in sufficient detail (including equipment, reagents and consumables) to perform the test. Where appropriate, reference may be made to methodology described in other diagnostic protocols annexed to this standard.

In cases where more than one method can be used reliably, other appropriate methods may be presented as alternative or supplementary methods, e.g. where morphological methods can be used reliably and appropriate molecular methods are also available.

Where appropriate, methods for isolation of pests from asymptomatic plants or plant products (such as tests for latent infection) are given, as well as methods for extraction, recovery and collection of pests from plant or other material. In these cases, methods may also be provided for direct identification of pests using biochemical or molecular tests on asymptomatic material.

For all the methods included in this section, information is provided on their sensitivity, specificity and reproducibility, where relevant. Where appropriate, guidance is provided on positive and negative controls and reference material to be included in tests. Guidance is also provided on removing possible confusion with similar and related species or taxa.

Diagnostic protocols provide guidance on the criteria for the determination of a positive or negative result for each method or information necessary to determine if an alternative method be applied.

³ BIOLOG: Biological Identification Systems and Microbiological Identification Systems

⁴ Polymerase Chain Reaction

⁵ TaqMan: ABIPRISM[®] 7700 Sequence Detection System

⁶ Restriction Fragment Length Polymorphism

Those cases where the use of appropriate controls for a specific technique, including where relevant reference material, is essential are clearly indicated in the protocol. When appropriate controls are not available, other tests, preferably based on different identification principles, may increase the certainty of the identification. Alternatively, a sample, specimen or, where appropriate, an image should be sent to another laboratory with experience in diagnosis of the suspected pest and possessing the required control or reference materials. Specimen(s) or material for reference purposes should be properly preserved.

Methods for quick, preliminary indications of identity (which will later need to be confirmed) may also be included in diagnostic protocols.

2.6 Records

This section provides information on the records that should be kept:

- scientific name of pest identified
- code or reference number of the sample (for traceability)
- nature of the infested material including scientific name of host where applicable
- origin (including the geographic location if known) of the infested material, and location of interception or detection
- description of signs or symptoms (including photographs where relevant), or their absence
- methods, including controls, used in the diagnosis and the results obtained with each method
- for morphological or morphometric methods, measurements, drawings or photographs of the diagnostic features (where relevant) and, if applicable, an indication of the developmental stage(s)
- for biochemical and molecular methods, documentation of test results such as photographs of diagnostic gels or ELISA printouts of results on which the diagnosis was based
- where appropriate, the magnitude of any infestation (how many individual pests found, how much damaged tissue)
- the name of the laboratory and, where appropriate, the name of the person(s) responsible for and/or who performed the diagnosis
- dates of collection of the sample, and of detection and identification of the pest.
- where appropriate, state of the pest, alive or dead, or viability of its development stages.

Evidence such as culture(s) of the pest, nucleic acid of the pest, preserved/mounted specimens or test materials (e.g. photograph of gels, ELISA plate printout results) should be retained, in particular in cases of non-compliance (ISPM No. 13: *Guidelines for the notification of non-compliance and emergency action*) and where pests are found for the first time (ISPM No. 17: *Pest reporting*). Additional items may be required under other ISPMs such as ISPM No. 8 (*Determination of pest status in an area*). The period for which records should be kept depends on the purpose for which a diagnosis is made.

Records and evidence of the results of the diagnosis should be retained for at least one year in cases where other contracting parties may be affected by the results of the diagnosis.

2.7 Contact points for further information

Contact details of organizations or individuals with particular expertise on the pest(s) are provided; they may be consulted regarding details on the diagnostic protocol.

2.8 Acknowledgements

The name and address of the experts who wrote the first draft of the diagnostic protocol are given, together with those of any others who made major contributions.

2.9 References

References to accessible scientific publications and/or published laboratory manuals are given that may provide further guidance on the methods and procedures contained in the diagnostic protocol.

3. Publication of Diagnostic Protocols

Diagnostic protocols are published as annexes to this ISPM and thus are individual publications under the IPPC framework with a specific publication and/or revision date. If appropriate, they may also form part of other ISPMs. The process of their adoption includes stringent review by internationally acknowledged scientists/experts for the relevant discipline.

An index to the annexes is provided as Appendix 2 [Appendix 2 will be added to the standard when protocols have been approved].

APPENDIX 1

**MAIN ELEMENTS OF THE PROCEDURE FOR THE DEVELOPMENT
OF DIAGNOSTIC PROTOCOLS****1. Production of Diagnostic Protocols**

The TPDP will commission an expert to lead the development of a diagnostic protocol by adapting, as appropriate, protocols that have already been approved by RPPOs, or other international or national organizations, or by developing a new diagnostic protocol. The diagnostic protocol will be developed further by a small group of experts selected by the TPDP and will then be submitted, in cooperation with the IPPC Secretariat, to the TPDP which, when satisfied with the content, will submit it to the Standards Committee.

2. Review of Existing Diagnostic Protocols

TPDP members will review the diagnostic protocols in their discipline on an annual basis or as determined by the TPDP. A request for a revision to a diagnostic protocol may also be submitted by NPPOs, RPPOs or CPM subsidiary bodies through the IPPC Secretariat (ippc@fao.org), which will in turn forward it to the TPDP.

The TPDP will evaluate the request, identify those diagnostic protocols that require revision and oversee their revision. New methods should be at least equivalent to existing methods or provide a significant advantage for their worldwide application such as costs, sensitivity or specificity. Appropriate evidence should be provided to support any claims.

3. Requests for New Diagnostic Protocols

Requests for new diagnostic protocols, in addition to those identified in the work programme of the TPDP, should be sent by NPPOs, RPPOs or CPM subsidiary bodies through the IPPC Secretariat using a form for topics and priorities for standards, by 31 July of each year.