Report of the meeting of the Technical Panel on Diagnostic Protocols,
16-20 October 2006, Valencia, Spain

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1. Introduction

The technical panel on diagnostic protocols (TPDP) was welcomed to the Instituto Valenciano de Investigaciones Agrarias (IVIA) by the Director, Dr Florentino Juste. The Panel was given an introduction to the work of the Centre of Plant Protection and Biotechnology and the Spanish in vitro quarantine system for citrus by Professor Luis Navarro. The panel visited the Iberflora horticultural trade fair and a citrus packaging company, Fontestad. Gerard Clover (New Zealand) was elected chair.

2. Update on the Commission on Phytosanitary Measures (CPM) and Standards Committee (SC) meetings

The steward informed the TPDP that ISPM No. 27 *Diagnostic protocols for regulated pests* had been adopted by CPM-1 in April 2006. He also informed the panel that the SC at their meeting in May 2006 had noted and agreed the recommendations proposed by the panel at the TPDP meeting in 2005.

3. Instructions to authors

The TPDP considered the draft instructions to authors, which had been amended to reflect changes introduced into ISPM No. 27 by CPM-1. Further amendments were made to the text during the meeting. In particular, the following aspects were clarified:

- Diagnostic protocols (DPs) should be formatted in the IPPC style as outlined in the Procedural Manual.
- DPs should contain all the information of methods necessary to be able to perform tests, but should not be written in the form of standard operating procedures.
- Annexes should not normally be included, but there may be occasions where it would be helpful to include specific details in annexes.
- Information on the specificity, sensitivity and reliability of methods should be included in the DP. In particular, this information should provide guidance on the level of certainty of the diagnosis associated with each method.
- Where the use of several methods in combination is recommended in a DP, the reasons for the recommendation and the effect on the level of certainty of the diagnosis should be indicated.
- Where methods had been validated by multi-laboratory ring testing, the scope of the ring testing should be indicated and a reference to the results of the validation should be included.
- Flow charts may be included in DPs, but they should not be presented as decision schemes. This is because DPs will be used by national plant protection organizations (NPPOs) under different circumstances. For example, the required certainty of a diagnosis of the first finding of a pest on a continent may differ from that for surveillance for a pest that occurs in a country.

4. Review of diagnostic protocols

The TPDP reviewed progress with the development of DPs. Fourteen DPs are in draft form and seven were submitted to the TPDP for their consideration at the meeting (*Erwinia amylovora, Liberibacter/Liberobacter, Plum pox virus, Thrips palmi, Trogoderma granarium, Xanthomonas fragariae, Xanthomonas axonopodis* pv *citri*).

The panel commended the authors of all draft DPs for the quality of the documents. The panel acknowledged that it had been difficult in some cases for authors to give priority to the development of DPs.

The TPDP were informed by the IPPC Secretariat that a statement of commitment and conflict of interests form for experts would be considered by the SC. This should ensure that prior to nomination by an NPPO authors had agreement from their organization to be given time to work on the DP.

The TPDP confirmed the composition of editorial teams for the remaining DPs following consideration of the nominations of authors (Annex 2). The panel recommended that further nominations are sought by the IPPC Secretariat for authors for *Gymnosporangium* spp. from Asia and North America. The IPPC Secretariat will notify the International Seed Testing Association (ISTA) and the International Seed Federation (ISF) of the editorial team for *Tilletia indica*.

Maria Lopez and Mariano Cambra gave presentations on the development of the DPs for *Erwinia amylovora* and *Plum pox virus* respectively, indicating the reasons for the choice of methods for detection and identification of these organisms that had been included in the draft DPs. The TPDP were pleased to be able to discuss the issues associated with drafting the DPs with the authors. The discussions provided information on the limitations of the methods included in the draft DPs and illustrated the difficulty in providing quantitative data on the certainty of diagnosis with different methods. The panel considered it was essential to include background information in DPs on the advantages and limitations of methods. This information would help NPPOs decide on the methods to be used for pest diagnosis under their circumstances.

The TPDP discussed the definition of specificity and sensitivity of methods as used for evaluation of medical diagnostic methods and which have been used in the evaluation of methods for EPPO DPs.

The panel also discussed the criteria required for diagnoses for different purposes. For example, where the consequences of a false negative test are large (e.g. post-entry quarantine testing) a higher sensitivity may be required than in situations where the consequences are less (e.g. surveillance for pests known to occur in a country or region). A lower specificity may be acceptable where the consequences of a false negative test are large.

In addition to the specificity, sensitivity and reliability of methods, the TPDP agreed that where combinations of methods are included, it is important that the reasons for such combinations are provided. An (indicative) flow diagram may also be useful in these cases. The panel also discussed the limitations of requiring combinations, such as the chances of having false negatives if methods with different sensitivities are combined.

The TPDP considered that the guidance should allow diagnosticians and policy makers to make decisions on the certainty of the diagnosis. They agreed that this guidance did not have to be quantitative.

The panel agreed that the DP for *Thrips palmi* should be recommended for country consultation. They made suggestions for editorial changes for the other DPs for consideration at their next meeting.

5. Review of procedures

The TPDP considered the working procedures for the production of DPs and revised them based on their experience with commissioning DPs, working with editorial teams and editing draft DPs (Annex 3).

The TPDP discussed the process of country consultation for DPs and the need for adequate time for consideration of any technical issues arising from the country consultation process. In contrast to the panel's recommendation after their 2005 meeting, the TPDP recommended that DPs should be put through the fast track procedure. If DPs are submitted to the IPPC Secretariat by 1 December and go for member consultation in February, this should allow sufficient time after member consultation for any technical objections to be considered. In such cases the TPDP discipline lead and the editorial team would be able to consider technical objections and propose solutions before the November SC meeting.

The TPDP also agreed it was important to review DPs annually once they are adopted because diagnostic methods are continually improving. The procedure for updating methods in DPs should be simple as possible. The panel considered that for small non-controversial changes it should not be necessary to have a full country consultation process and recommended that such changes should be approved by the TPDP. Examples might include a modification to an existing method such as a new primer set or antibody which had been demonstrated to improve the published method. It was noted that the updating of some Codex protocols is not subject to country consultation.

6. Priorities for other standards

Following recommendations from the technical panel on pest free areas and systems approaches for fruit flies (TPFF) and a discussion by the TPDP on plants as pests, the panel recommended that the following are added to the work programme:

- Identification of immature stages of fruit flies by DNA techniques
- *Sorghum halepense*.

The TPDP was also asked by the TPFF to consider the topic of "the use of molecular methods for determining the medfly and Oriental fruit fly haplotypes". The TPDP requested that the TPFF provide further information on the necessity of producing an international standard on this subject.

In considering the need for DPs on plants as pests, the TPDP agreed that a discussion document would be produced by the discipline lead on botany for the next meeting. This would provide an overview of the plants as pests regulated by NPPOs and would help the TPDP make recommendations on priorities at the next meeting.

7. Validation of methods and quality assurance issues

The panel discussed the requirement for information on the specificity, sensitivity and reliability of methods included in DPs (see section 4). They noted that methods could be evaluated and validated in different ways. For example, a method could be compared in a single laboratory for reliability and performance against an existing method or it may be subject to inter-laboratory comparison using a common set of samples, usually tested blind. There are also proficiency tests, which determine the ability of a laboratory or operator to detect a pest in a specific set of samples, usually using the routine method used by the laboratory.

The panel agreed that the term "validation" when used in DPs would only refer to methods validated by ring test. They also agreed that it was important for diagnosticians to be aware of the scope of such a validation. The panel agreed that it was not practical to require such validation for all methods included in a DP, but it was desirable to include methods validated by ring testing where they were available and in some cases inter-laboratory validation may be considered necessary.

The panel agreed specificity, sensitivity and reproducibility should be considered again at their next meeting. They agreed that the discipline lead on quality assurance should be asked to prepare a discussion paper on quality assurance issues relating to DPs for the next meeting.

8. Reference labs

The TPDP were informed that the Technical Consultation (TC) of Regional Plant Protection Organizations (RPPOs) had discussed the topic of reference laboratories for diagnosis of regulated pests. The RPPOs considered it would be useful to do a survey/questionnaire on the use and functions of reference labs in NPPOs. The panel discussed a proposal from the TC to cooperate on activities related to reference laboratories for regulated pests. The TPDP agreed that information on reference laboratories in countries would be valuable. The panel agreed that there was no immediate need to set up international reference laboratories. The TPDP proposed that the steward should cooperate with the RPPOs on work related to reference labs. In the meantime panel members would discuss the issue with RPPO colleagues.

The panel considered that the Specification for Technical Panels No. 1 (first revision) should be modified to reflect the need for the panel to work with organizations on issues associated with the development of DPs (Annex 4).

9. Publication issues

The TPDP discussed the request by some authors to include pictorial keys in DPs. The panel considered that any pictures necessary for the DP should be included. The IPPC Secretariat informed the panel that it may not be possible to publish all photographs in book format and photographs may be only available for downloading from the internet.

The panel agreed that for some pests there could be value for diagnosticians to have access to pictorial keys. The panel considered such material should not be referenced by a link to an external web site because these

sites are subject to change. The panel therefore recommended that any pictorial keys should be placed on the IPP.

10. Work programme

The TPDP agreed a work programme (Annex 5).

11. Recommendations for the SC

The following recommendations are proposed to the SC. See the SC May 2007 report for final decisions.

The SC is requested to:

- *note* the revised instructions to authors
- *note* the authors of DPs
- *note* the revised working procedures
- *agree* that the DPs are put through the fast track procedure and *note* that *Thrips palmi* DP will be submitted in December 2006
- *propose* additional items for the work programme (in addition to those agreed in May):
  - Identification of immature stages of fruit flies by DNA techniques
  - *Sorghum halepense*
- *approve* the revised specification and *note* that the steward will cooperate with the TC of RPPOs on activities related to reference laboratories.

Annex 1

Diagnostic protocols for regulated pests

Instructions to authors

These instructions are based on International Standard for Phytosanitary Measures (ISPM) No. 27 (*Diagnostic protocols for regulated pests*) and are compiled to provide more specific explanatory guidance for authors of diagnostic protocols (DPs). Authors are encouraged to study ISPM No. 27 to ensure that the DP is consistent with the standard.

1 General considerations

DPs are published as annexes to ISPM No. 27 (*Diagnostic protocols for regulated pests*). They describe procedures and methods for the detection and identification of pests that are regulated by Contracting Parties of the International Plant Protection Convention (IPPC) and relevant for international trade. They are addressed to diagnosticians/diagnostic laboratories performing official tests as part of phytosanitary measures. The DPs provide guidance on the diagnosis of specified pests. Information is provided on the specified pest, its taxonomic status and the methods to detect and identify it. The DPs contain the minimum requirements for reliable diagnosis of the specified pest and provide flexibility to ensure the methods are appropriate for a range of circumstances of use.

DPs may cover a species, taxa below species level, several species within a genus, or an entire genus, for example where several species within a genus are regulated pests.

Authors should draft DPs in accordance with the requirements given in the main text of ISPM No. 27.

General guidelines on the formatting of DPs are appended. By using these guidelines, authors will help ensure consistency between DPs and facilitate processing of draft DPs. These guidelines will be consolidated as more DPs are developed. Authors are also invited to refer, as a model, to the first DP (for *Thrips palmi*).

DPs are drafted by a group of authors called an editorial team co-ordinated by a lead author and overseen by a discipline lead from the TPDP. The editorial team, including the lead author, is recommended by the TPDP discipline lead and approved by the entire TPDP. Authors are encouraged to have draft DPs peer-reviewed by the wider scientific community, prior to submission for acceptance by the TPDP.

2 Definitions

Pest diagnosis is defined as follows:

- *Pest Diagnosis* – the process of detection and identification of a pest.

3 Methodology

Each DP should contain the methods and guidance necessary for the named pest(s) to be detected and positively identified by an expert (i.e. an entomologist, mycologist, virologist, etc.). Authors should select methods on the basis of their sensitivity, specificity and reproducibility, also taking into account the availability of equipment, the expertise required for these methods and their practicality (for example, ease of use, speed and cost).

If necessary, DPs may describe more than one method to take into account the varying capabilities of laboratories and the situations for which the methods are applied. Such situations include diagnosis of different developmental stages of pests, which require different methodologies, as well as the degree of certainty required by the National Plant Protection Organization (NPPO). For some purposes a single method may be sufficient, for others a combination of methods may be necessary. This applies both to the minimum requirements for a diagnosis and where additional requirements are necessary (such as where a high degree of certainty in the diagnosis is required). In cases where morphological methods can be reliably used but appropriate molecular methods have been developed, the latter should be presented as alternative or supplementary methods.

All methods should be described separately in a consistent manner with sufficient detail (including equipment, reagents and consumables) to be able to perform the test without further reference to the

literature. However, if the method is based on a commercial kit it is not necessary to repeat the manufacturer's instructions. DPs should not be written in the form of standard operating procedures but should provide sufficient detail to allow NPPOs to develop such procedures. Where appropriate, reference may be made to methodology described in other adopted DPs annexed to the ISPM No. 27.

For all methods, information on their sensitivity, specificity and reproducibility, and specifications from multi-laboratory validation trials (when available) should be included.

Guidance on positive and negative controls and reference material should be included in each of the tests. Cases where the inclusion of appropriate controls, including reference material, is essential (e.g. enzyme-linked immunosorbent assay [ELISA]) should be indicated. Sources and specifications (technical, commercial, collection entry codes) of controls and reference materials (e.g. catalogue numbers of bacterial reference strains) should be indicated.

Authors should provide information and guidance on methods that either singly or in combination lead to diagnosis of the pest. Guidance should also be provided on the interpretation of results, in particular the criteria for the determination of a positive or negative result for each method.

It is not necessary to include all methods which have been reported for a particular pest, only those which are reliable, currently available and considered to be of use for the purposes described in ISPM No. 27.

If several methods are needed for the diagnosis, and / or if many alternative methods are included, a schematic flow diagram should be presented. The diagram should indicate the reliability of each method or combination of methods. It is not intended to be a decision-making tree but is intended to assist NPPOs in determining which method(s) are appropriate for use under different circumstances.

When several methods are mentioned, their advantages and disadvantages should be given (e.g. duration of the test, cost, availability of reagents, requirements for specialized knowledge or equipment) as well as the extent to which the methods or combinations of methods are equivalent.

4 Structure and content of a diagnostic protocol

DPs should follow the layout of section 2 of ISPM No. 27 and should be arranged into the following sections, numbered as follows:

1. Pest information
2. Taxonomic information
3. Detection
4. Identification
5. Records
6. Contact points for further information
7. Acknowledgements
8. References

Each section should be divided into sub-sections as required (especially the detection and identification sections) and both sections and sub-sections should be numbered. An index of the sections should be included at the start of the DP and the pages of the DP numbered. As DPs themselves will be annexes to ISPM No. 27, they should not have annexes or appendices.

4.1 Pest information

Authors should provide brief information on the pest (generally less than one page of type-written text), 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 geographic distribution (in general), mode of transmission and dissemination (vectors and pathways). It is not necessary to include specific details about the epidemiology of the disease or its management.

Supplementary information, such as detailed information on the pest's geographic distribution or hosts, should not be included except when directly relevant for diagnosis. The DP is not intended to be a pest data sheet but such information should be referenced when available.

4.2 Taxonomic information

Under this paragraph, the correct scientific name and authority should be given and an overview of the relevant taxonomic hierarchy (e.g. Kingdom, Phylum, Order, Family, Genus, Species, relevant sub-specific taxon). Include synonyms and relevant former names (these may be taxonomically incorrect but relevant in relation to the literature) as appropriate. For fungi, the teleomorph name should be used; teleomorph synonyms may be included as appropriate. The anamorph name and its synonyms (as relevant) should also be presented. For viruses, internationally recognized acronyms should be included.

4.3 Detection

Authors should provide information and guidance on:

- the plants, plant products or other articles capable of harbouring the pest
- the signs 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 it may be found
- the developmental stages of the pest that may be encountered, together with their likely concentration 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 discovering 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 ELISA tests, culturing on selective media or baiting.
- viability of the pest

Guidance should be provided on resolving possible confusion with similar signs and symptoms due to other causes.

Methods for detection may be interpreted differently depending on the type of pest being considered. For example, detection of an insect may relate to observation of individuals or signs of damage in consignments, whereas detection methods for bacteria may involve culturing extracts of suspected plant material on differential or semi-selective medium.

When a detection method may also be used for identification, it is recommended that it is described in the detection section and then referred to in the following identification section. Any comments about its use for detection or identification should be included in the relevant section. Methods that detect a group of pathogens rather than a specific organism should be described in the detection section.

Sampling procedures for inspectors and inspectors' instructions on recognition of the pest from signs and symptoms should not be included. Procedures for inspectors are likely to be covered in an inspection manual.

4.4 Identification

In this section, in addition to a description, authors should provide information and guidance on methods that either used alone or in combination lead to the identification of the pest. Methods for quick, presumptive indications of identity (which will later need to be confirmed) may also be included.

Two main types of methodology are included in DPs, methodologies based on morphological, morphometric or biological characteristics of a pest and those based on biochemical and molecular properties. Morphological characteristics may be investigated directly or may only be examined after culturing or isolation of the pest. This may also be required for biochemical and/or molecular assays. Where culturing or isolation procedures are necessary components of methods, details should be provided.

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

For morphological identifications, details should be 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 diagnostic characters, and an indication of any difficulties in seeing particular structures
- comparison with similar or related species
- relevant reference specimens or cultures.

Guidance should be provided on resolving possible confusion with similar and related species or taxa.

For molecular methods, details should be provided, as appropriate, on:
- the target sequence (e.g. target gene, amplicon size and location) and reaction conditions (e.g. oligonucleotide sequence, enzyme source and thermal cycler)
- nucleic acid extraction and purification (e.g. tissue sources, extraction and purification methods, and nucleic acid concentration
- reverse transcription (e.g. reaction volume, concentration and volume of constituents, denaturation and incubation temperatures)
- polymerase chain reaction (e.g. reaction volume, concentration and volume of constituents, thermocycling conditions)
- restriction analysis (e.g. DNA preparation, reaction volume, concentration and volume of constituents, denaturation and incubation conditions)

4.5 Records

In this section, authors should refer to section 2.5 of ISPM No. 27 which lists the records required to be kept. There is no need to repeat section 2.5, only records that are required in addition to those detailed in ISPM No. 27 should be listed in the DP. However, in addition, authors should include a description of appropriate evidence of results where other NPPOs may be adversely affected by the results of the diagnosis and therefore the records and evidence of the results of the diagnosis should be retained for at least one year.

4.6 Contact points for further information

In this section, authors should provide contact details (name, address, e-mail, telephone, facsimile, etc.) of organizations or individuals with particular expertise on the pest(s), which may be consulted regarding any questions on the DP. These contacts must agree to act in this capacity prior to their inclusion in the DP.

4.7 Acknowledgements

In this section, the name and address of the experts who wrote the first draft of the DP are given, together with those of any others who made major contributions. In instances where these experts are the same individuals as those listed in the preceding section, the details should be cross-referenced.

It is anticipated, and desirable, that draft protocols will be circulated for peer-review by the scientific community prior to submission for acceptance by the TPDP. Details of such reviews should not generally be included in the protocol but should be detailed in a covering letter upon submission.

4.8 References

In this section, references to scientific publications and published laboratory manuals should be given. The references should be kept to a minimum and should concern the diagnosis of the pest and species with which the pest may be confused, its symptomatology and methods for extraction, detection and identification. It is not necessary to include a complete list of references concerning geographic distribution, host lists, epidemiology and general biology, although reference may be made to key publications which review this information, e.g. pest data sheets.

See the guidelines in the Appendix to these Instructions to authors for the format of references.

Appendix - Guidelines on formatting of diagnostic protocols

General guidelines on formatting of ISPMs are given in "Administrative guidelines for the structure of standard-setting documentation" in the IPPC Procedural Manual, which can be found on the internet on the IPP (https://www.ippc.int). This Appendix partly uses these Administrative guidelines but also gives additional recommendations that are specific to DPs.

1- TITLE AND CONTENTS PAGE

The first page refers to ISPM No. 27 (*Diagnostic Protocols for Regulated Pests*) and gives the title of the protocol. At the drafting stage, only the title of the draft is needed i.e. the name of the organism/s for which the protocol is drafted. The formatting and other details will be added by the Secretariat at a later stage.

A table of contents is also included on the first page. It should be added below the title. It lists all sections, including all numbered headings and subheadings. At the drafting stage, such a table of contents should be included in the standard, but it is not necessary to indicate page numbers.

2- MAIN TEXT

Section on endorsement

The first section of the standard should be added as follows:

> **"Endorsement**
> This diagnostic protocol was adopted by the Commission on Phytosanitary Measures in ---- [to be completed after adoption]."

Numbered headings and sub-headings

Individual sections are detailed in the instructions on formatting of ISPMs above. Headings, sub-headings and further subdivisions should be numbered with Arabic numbers, for example: 1.1, 1.2.1, 1.3.2.2, etc.

Titles of level one (1., 2. etc) have a capital letter at the beginning of each word. Other numbered titles have only one capital letter at the beginning of the title.

Use of figures and tables

All figures and tables should be numbered with Arabic numbers and should be referred to in the text.

Figures should be of a sufficient quality for printing. A high quality file of each illustration should be provided, separately from the text, to the IPPC Secretariat.

Terminology

- Phytosanitary terms should be used according to the most recent version of the ISPM No. 5: *Glossary of phytosanitary terms.*
- The general dictionary reference for English ISPMs is the Oxford English dictionary.
- Use *organize* (*organization*), authorize (*authorization*) and *recognize* (and not *organise* or *recognise*).
- Use *website* and not *Web site* or *Website.*

Latin names

- The species name should be written in full at its first occurrence, e.g. *Thrips palmi*, and shortened at others: *T. palmi*. If another species of the same genus are mentioned later in the text, it is not necessary to write the genus name in full, e.g. *T. flavus.*
- Latin names are italicised (but not spp., sp. etc.)

Measurement units

- When measurement units are abbreviated, the standard abbreviation should be used, e.g.:

m	meter
s	second
W	watt
min	minutes

Lists of items

- In a list of items, the first level should be indicated by a "-"and the following level by "•". Avoid using automatic bullet points.
- If the list of items is composed of sentences, each item should start with a capital letter and end with a period.
- If the list of items is word or expressions, but not sentences, each item should start with a lower case letter, and there should be no ";" or period at the end of each indent. The last item should end with a period.

Specific editorials

- There should be no comma before "and" in a list. e.g. "IPPC, NPPOs and RPPOs" and not "IPPC, NPPOs, and RPPOs".
- When a term is used which has an acronym (e.g. PRA), the first occurrence in the introduction section, in the main text and in an annex or appendix should be written in full with the abbreviation between brackets (e.g. pest risk analysis (PRA)). Other occurrences should use only the abbreviation. In main titles, such terms should be written in full (and the abbreviation should not be mentioned).

List of references

References should be in alphabetical order.

References to other ISPMs and the IPPC are detailed in the procedural manual. Regarding scientific references and other publications, some examples extracted from the DP for *Thrips palmi* are given below. Attention is drawn to the fact that the total number of pages should be included for references to books.

Article in a journal or proceedings

Bhatti, J.S. 1980. Species of the genus *Thrips* from India (Thysanoptera). *Systematic Entomology*, 5: 109–166.

Brunner, P.C., Fleming, C. & Frey, J.E. 2002. A molecular identification key for economically important thrips species (Thysanoptera: Thripidae) using direct sequencing and a PCR-RFLP-based approach. *Agricultural and Forest Entomology*, 4: 127–136.

Murai, T. 2002. The pest and vector from the East: *Thrips palmi*. *In* R. Marullo, & L.A. Mound, eds. *Thrips and Tospoviruses: Proceedings of the 7th International Symposium on Thysanoptera*. Italy, 2–7 July 2001, pp. 19–32. Canberra, Australian National Insect Collection.

Book:

Mound, L.A. & Kibby, G. 1998. *Thysanoptera. An Identification Guide*. 2nd edition. Wallingford, UK, CAB International. 100 pp.

Nakahara, S. 1994. The genus *Thrips* Linnaeus (Thysanoptera: Thripidae) of the New World. USDA Technical Bulletin No. 1822. 183 pp.

Sakimura, K., Nakahara, L.M. & Denmark, H.A. 1986. A thrips, *Thrips palmi* Karny (Thysanoptera: Thripidae). Entomology Circular No. 280. Division of Plant Industry, Florida; Dept. of Agriculture and Consumer Services. 4 pp.

Section from a book:

EPPO/CABI. 1997. *Thrips palmi*. *In* I.M. Smith, D.G. McNamara, P.R. Scott & M. Holderness, eds. *Quarantine Pests for Europe*, 2nd edition. Wallingford, UK, CAB International.1425 pp.

CD-Rom

Moritz, G., Mound, L.A., Morris, D.C. & Goldarazena, A. 2004. Pest thrips of the world: visual and molecular identification of pest thrips (CD-ROM), Centre for Biological Information Technology (CBIT), University of Brisbane. ISBN 1-86499-781-8.

Annex 2

Table of experts for Diagnostic Protocols
(agreed by TPDP 2006-10-20)

Title	Discipline Lead (TPDP member)	Main Author	Editorial Team
Bacteria	Lum Keng-Yeang (MY)		
Erwinia amylovora		Maria Lopez (ES)	Robert Taylor (NZ) Rodney Roberts (US)
Xyllela fastidiosa		Marta Isabel Francis Mastalli (UY)	Helga Reisenzein (AT) John Hartung (US)
Xanthomonas axonopodis pv. *citri*		Enrique Francisco Verdier Rossi (UY)	Rita Christina Lanfranchi (AR) Maria Lopez (ES)
Liberibacter spp. */ Liberobacter* spp.		Rita Christina Lanfranchi (AR)	Solke de Boer (CA) Jancek Planzinski (AU)
Xanthomonas fragariae		Ed Civerolo (US)	Solke de Boer (CA) Maria Lopez (ES) John Elphinstone (UK)
Fungi and fungus-like organisms	Hans de Gruyter (NL)		
Phytophthora ramorum		Kelvin Hughes (UK)	Stephan Brière (CA) Mary Palm (US)
Tilletia indica / T. controversa		Dominie Wright (AU)	Kelvin Hughes (UK) Guiming Zhang (CN)
Guignardia citricarpa		Irene Vloutoglou (GR)	Johan Meffert (NL) Luis E Diaz Morales (UY)
Gymnosporangium spp		*Call for Asian and North American experts*	
Insects and mites	Ana Lía Terra (UY)		
Anastrepha spp.		Vicente Hernández-Ortiz (MX)	Norma Christina Vaccaro (AR) Alicia Leonor Basso (UY)
Anoplophora spp.		Hannes Krehan (AT)	Stephen Lingafelter (US) Alba Enrique Briano (AR) Yulin An (CN) Briggita Wessels-Berk (NL)

Title	Discipline Lead (TPDP member)	Main Author	Editorial Team
Trogoderma granarium		Andras Szito (AU)	Witold Karnovski (PL) Alba Enrique Briano (AR)
Thrips palmi		Dominique Collins (UK)	Bert Vierbergen (NL) Norma Christina Vaccaro (AR)
Nematodes	Esther van den Berg (ZA)		
Ditylenchus destructor / D. dipsaci		Antoinette Swart (ZA)	Maria Elena Manna (AR) Eliseo Jorge Chaves (AR)
Xiphinema americanum		Sue Hockland (UK)	Antoinette Swart (ZA) Saša Širca (SI) Eliseo Jorge Chaves (AR)
Bursaphelenchus xylophilus		Thomas Schröder (DE)	Vladimir Gaar (CZ) David McNamara (ex EPPO) Maria Elena Manna (AR)
Viruses and Phytoplasmas	Daphne Wright (UK), and Gerard Clover (NZ)		
- *Plum pox virus*		Mariano Cambra (ES)	Laurene Levy (US) Sergio Luis Lenardon (AR) Noland Africander (ZA)
- Tospoviruses (TSWV, INSV, WSMV)		Tom German (US)	Jane Morris (UK) Concepción Jordá-Gutiérrez (E) Gerhard Pietersen (S. Africa)
- *Citrus tristeza virus*		Mariano Cambra (ES)	Stephanus Petrus van Vuuren (ZA) Marta Isabel Francis Mastalli (UY/US) Laurene Levy (US)
- Phytoplasmas (general)		Philip Jones (UK)	Wilhelm Jelkmann (DE) Ester Torres (ES Fiona Constable (AU) Jacobus Verhoeven (NL) Lia Liefting (NZ)

Annex 3

Technical Panel on Diagnostic Protocols (TPDP)

WORKING PROCEDURES

Annual work programme

- The TPDP annually identifies priorities for the development of a diagnostic protocol (DP) taking into account guidance from the Standards Committee (SC) and any requests for reviews and amendments to a DP that have been received by TPDP members. The TPDP submits recommendations on priorities to the SC. NPPOs and RPPOs may also submit topics for a DP in response to the biennial call made by the IPPC Secretariat for topics to be considered for the IPPC standard setting work programme.
- The TPDP reports annually through the Steward to the SC. This report includes the achievements during the year and a proposed work programme.

Nominations of experts

- Once topics for protocols are put on the work programme, the IPPC Secretariat issues a call requesting nominations of experts for DPs identified as priorities and posts the call on the IPP. For seed related DPs the Secretariat also informs the International Seed Testing Association and the International Seed Federation of the call.
- Under exceptional circumstances the TPDP discipline leads may invite experts to submit a nomination.
- The CVs of nominated experts are reviewed by the discipline lead taking into account the expertise required for authors for DPs. The TPDP discipline lead recommends a suitable expert to lead the development of a DP (lead author) and a small group of experts to assist them with the development (editorial team). This information, along with a summary of the expertise of each expert is submitted, to the TPDP, who agree or amend the recommendations as appropriate.

Expertise required for experts to draft DPs

- The editorial team should have appropriate global coverage.
- Authors of existing DPs should be included in the editorial team.

<u>Core expertise required:</u>

- technical and scientific expertise with the pest, especially diagnostic expertise.

<u>Additional expertise that would be helpful:</u>

- taxonomy and molecular diagnostics
- practical experience related to the pest (detection, identification, isolation etc.)
- quarantine DP expertise
- drafting of DPs (such as regional DPs)
- development of novel diagnostic methods
- experts associated with international seed testing organizations to be included where appropriate.

The development of a draft DP

- The lead author uses ISPM No. 27 (*Diagnostic Protocols for Regulated Pests*) and the Instructions to authors to produce the draft and additional guidance is provided by the TPDP discipline lead if needed.
- The lead author is assisted in the preparation of the DP by the editorial team.

Changes to the editorial team

- When an expert who has been chosen as lead author is unable to continue in this role, the TPDP discipline lead will ask a member of the editorial team to become the lead author. The TPDP is informed of the change of leadership.
- Where additional experts are required for the editorial team, the TPDP discipline lead, in consultation with the lead author, chooses from the experts nominated in the original call for authors. If no suitable experts are available, the IPPC Secretariat is requested to seek nominations for the DP by announcing the vacancy on the IPP, with a 30 day deadline for receipt of CVs. The TPDP discipline lead or editorial team may also invite additional experts to submit their CVs. These experts should attempt to ensure their NPPO supports their nomination. The TPDP discipline lead reviews the CVs and submits a recommendation of an expert, along with a summary of their expertise to the TPDP, who reviews and approves the addition.

Assessment of draft DPs by the TPDP

- The lead author, once satisfied with the draft DP, submits it to the TPDP discipline lead.
- The draft DP may have already been reviewed by a wider group of experts (i.e. peer review) from the particular discipline related to the DP.
- The TPDP discipline lead reviews the draft DP and ensures it meets all the requirements set out by ISPM No. 27 (*Diagnostic Protocols for Regulated Pests*) and instructions previously agreed to by the TPDP. Once they are satisfied with the draft DP the TPDP discipline lead sends the draft DP to the entire TPDP for assessment.
- The TPDP either finds the draft DP suitable for member consultation and recommends it to the SC or returns it to the editorial team for further work.

Review of member comments on a draft DP

- Member comments are compiled by the Secretariat and forwarded to the TPDP discipline lead.
- The comments are reviewed by the TPDP discipline lead, who produces an amended draft (with track changes and reasons documented) and circulates it to all TPDP members. The TPDP discipline lead may consult with the editorial team as needed.
- If substantial comments are received, they are dealt with by the TPDP coordinated by the TPDP discipline lead. Proposed changes may be incorporated, not incorporated or the TPDP may recommend further studies, with the reasons documented.
- The amended draft DP is then submitted to the SC.

Review of published DPs

- On an annual basis, the TPDP members oversee the review of existing DPs in their disciplines. If a change is required, the TPDP either modifies the DP using expertise within the panel and proposes a new draft to the SC or recommends inclusion of the DP in the annual work programme of the TPDP.
- The revised DP is submitted to the SC.

ROLE OF TPDP MEMBERS

TPDP members:

- Track and manage preparation of DPs under their lead.
- Prepare a written summary for each meeting of the status of each DP under their lead.
- Review published DPs annually.
- As necessary and in consultation with the editorial team for each DP, recommend updates to existing DPs with newly published and/or validated methods and modifications to methods for consideration by the TPDP.

Annex 4

SPECIFICATION FOR TECHNICAL PANELS NO. 1 (~~1ST~~ 2ND REVISION)
(changes proposed by the TPDP 20 October 2006)

Title: Technical Panel to develop diagnostic protocols for specific pests.

Reason for the Technical Panel: ICPM-6 identified the need for diagnostic protocols (DP) for specific pests to be recommended to the Standards Committee. To do this, a Technical Panel on diagnostics was proposed.

Scope and purpose: The Technical Panel will produce DPs for specific pests utilizing the format for DPs established by the Expert Working Group.

Tasks:
1. Identify priorities for specific DPs to be developed and submitted to the SC. Aspects to consider include:
   - availability of existing regional standards and/or DPs used by individual countries
   - suggestions for new DPs (i.e. those put forward by NPPOs, RPPOs, EWGs or other Technical Panels).
2. Identify specialists.
3. Produce or supervise the production of DPs for specific pests as future annexes to ISPM No. 27 (*Diagnostic protocols for regulated pests)*.
4. Submit to the SC draft DPs for specific pests and where necessary revision of previously adopted DPs.
5. Under the direction of the SC, consider other topics related to diagnosis of regulated pests (ISPM No. 27).

Provision of resources: Funding for meetings is provided from the regular programme of the IPPC Secretariat (FAO) except where expert participation is voluntarily funded by the expert's government.

Steward: Jens Unger.

Collaborator: To be determined.

Expertise: At least 5-7 participants comprised primarily of diagnostic (where appropriate taxonomic) experts with at least one representing each discipline: entomology, acarology, nematology, mycology, plant bacteriology, virology (including viroids and phytoplasma) and botany. Between them participants should have practical expertise in the use of morphological and molecular/biochemical diagnostic techniques, and in phytosanitary procedures.

Participants: To be determined.

Approval: Introduced into the work programme by the ICPM at its Sixth Session in 2004. Specification approved by the SC in April 2004. First revision approved by the SC in November 2004. Second revision approved by the SC in … .

References: Regional standards; NPPO DPs; diagnostic manuals; EPPO DPs; ISTA; other relevant information.

Annex 5

WORK PROGRAMME 2006-2007

Agreed by TPDP 20 October 2006

2006	
Oct	25 Secretariat to inform ISTA and ISF of the choice of experts for the *Tilletia indica* DP.
Nov	6-10 - SC7 13-17 - SC meeting. JU to inform SC of request the "fast track" process 13 *Thrips palmi* in track changes to all TPDP for final approval 13 Draft report to TPDP 24 Comments on *Thrips palmi* back to (ALT) 25 Revised TPDP working procedures and circulate to members (EvdB).
Dec	1 final version of *Thrips palmi* DP to Secretariat (ALT) 15 Comments on all DP presented at TPDP Valencia meeting to leads (All members TPDP) 15 Comments on draft report from TPDP to Secretariat
2007	
Jan	15 Documents to be submitted for the SC meeting in April 15 Instructions to authors to be sent to TPDP (GC & MML) 15 JU to prepare a brief paper on "Combination of methods" sensitivity/specificity/reliability and send out for TPDP members to consider for next meeting 30 DPs in track changes to TPDP (ALT & GC) (*Trogoderma granarium*, Plum pox)
Feb	15 TPDP comments on *Trogoderma granarium* and Plum pox back to leads 15 TPDP members comments on Instructions to authors back to GC
Mar	26-29 – CPM 15 final version of *Trogoderma granarium* and Plum pox DP to Secretariat (ALT and GC) 15 Revised Instructions to authors to Secretariat (GC) 30 DPs in track changes to TPDP (leads) *Liberibacter* spp */ Liberobacter* spp & *Erwinia amylovora)*
April	30-4 May - SC meeting – consider draft ISPM FF-SA 30 TPDP comments on *Liberibacter / Liberobacter* spp & *Erwinia amylovora* back to leads
May	
June	15 Call by Secretariat for *Gymnosporangium* authors (Asia and North America) and other pests added to TPDP work programme 30 final versions of *Liberibacter* spp */ Liberobacter* spp & *Erwinia amylovora* to the Secretariat
July	15 post paper on regulated plants as pests, request input from TPDP members (YLP) 15 Report of the ongoing cooperation on the development of a discussion paper regarding reference labs for the TC RPPO meeting (JU)
Aug	15 All other DP and other document to the Secretariat for posting
Sept	24-28 – next TPDP meeting, Agenda: • QA issues related to DPs (including combination of methods, sensitivity/specificity/reliability, accreditation of laboratories) • Summary report on the TC of RPPOS regarding the cooperation of the TPDP reference labs

Annex 6

Participants list for TPDP meeting, Valencia, Spain, 16-20 October 2006

Panel members

Jens-Georg Unger (Steward) Department for National and International Plant Health Federal Biological Research Centre for Agriculture and Forestry Messeweg D-38104 Braunschweig **Germany** Tel: +49-531-299-3370 Fax: +49-531-299-3007 Email: j.g.unger@bba.de	**Esther van den Berg** National Collection of Nematodes Biosystematics Division ARC – Plant Protection Research Instititute Private Bag x134, Queenswood 0121 **South Africa** Tel: +27-12-356-9828 Fax: +27-12-329-3278 Email: VDBergE@arc.agric.za
Gerard Clover Ministry of Agriculture and Forestry Biosecurity New Zealand PO Box 2095 Auckland **New Zealand** Tel: +64-9-574-4191; +64-9-299095709 Fax: +64-4-4744257 Email: gerard.clover@maf.govt.nz	**Johannes de Gruyter** Head of Mycology Department Plant Protection Service (NPPO) 15 Geertjesweg P.O. Box 9102 6706 HC Wageningen **The Netherlands** Tel: +31-317-496831 Fax : +31-317-421701 Email: j.de.gruyter@minlnv.nl
Yin Liping Deputy Director Plant Quarantine Lab. of Animal and Plant Inspection and Quarantine Technology Center Shanghai Exit and Entry Inspection and Quarantine Bureau 1208 Minsheng Road Shanghai 200135 **China** Tel: +86-21-68546481 Fax: +86-21-68546481 Email: yinlp@shciq.gov.cn; yinliping@yahoo.com	**Lum Keng-Yeang** CAB International – Southeast and East Asia Regional Centre P.O. Box 210 43400 UPM Serdang Selangor **Malaysia** Tel: +603-89432921; 603-89433641 Fax: +603-89426490 Email: ky.lum@cabi.org; lumky2@yahoo.com
Ana Lía Terra Head of Biological Laboratories Ministry of Livestock, Agriculture and Fishery Agricultural Services General Directorate (NPPO) Av. Millán 4703 Montevideo, CP.12900 **Uruguay** Tel: +598-2-3043992 Fax: +598-2-3043992 Email: alterra@adinet.com.uy	

Other participants

Jane Chard (IPPC Secretariat) Scottish Agricultural Science Agency 1, Roddinglaw Road Edinburgh EH12 9FJ **United Kingdom** Tel: +44-131-244-8863 Fax: +44-131-244-8940 Email: jane.chard@sasa.gsi.gov.uk	**Brent Larson (IPPC Secretariat)** Room B764 Plant Protection Service (AGPP) Food and Agriculture Organization of the United Nations Viale delle Terme di Caracalla 00153 Rome **Italy** Tel: +39-06-5705-4915 Fax: +39-06-5705-4819 Email: brent.larson@fao.org
Mariano Cambra (host) Instituto Valenciano de Investigaciones Agrarias (IVIA) Carretera Moncada-Náquera, km 5. 46113, Moncada, Valencia, **Spain**. Tel: +34 963424000 Fax: + 34 963424001 Email: mcambra@ivia.es	**María M. López (invited expert)** Instituto Valenciano de Investigaciones Agrarias (IVIA) Carretera de Moncada-Náquera Km 4.5 46113, Moncada, Valencia **Spain** Tel: 34-963424075 34-963424000 Fax: 34-963424001 Email: mlopez@ivia.es

Unable to attend

Daphne Wright Central Science Laboratory Sand Hutton York YO41 1LZ **United Kingdom** Tel: +44-(0)1904-462320 Fax: +44-(0)1904-462149 Email: d.wright@csl.gov.uk