

RAP PUBLICATION 2007/30

**REGIONAL STANDARDS
FOR PHYTOSANITARY MEASURES**

*GUIDELINES FOR PEST RISK ANALYSIS ON
SCALE INSECTS ASSOCIATED WITH
COMMODITIES FOR HUMAN CONSUMPTION*

APPPC RSPM No. 6



RAP PUBLICATION 2007/30

**REGIONAL STANDARDS
FOR PHYTOSANITARY MEASURES**

***GUIDELINES FOR PEST RISK ANALYSIS ON
SCALE INSECTS ASSOCIATED WITH
COMMODITIES FOR HUMAN CONSUMPTION***

The Asia and Pacific Plant Protection Commission (APPPC)
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
REGIONAL OFFICE FOR ASIA AND THE PACIFIC
Bangkok 2007

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

All rights reserved. Reproduction and dissemination of material in this information product for educational or other non-commercial purposes are authorized without any prior written permission from the copyright holders provided the source is fully acknowledged. Reproduction of material in this information product for resale or other commercial purposes is prohibited without written permission of the copyright holders. Applications for such permission should be addressed to the Plant Protection Officer, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, 39 Phra Atit Road, Bangkok 10200, Thailand or by e-mail to Yongfan.piao@fao.org

© FAO 2007

For copies write to:

Piao Yongfan
FAO Regional Office for Asia and the Pacific
Maliwan Mansion, 39 Phra Atit Road
Bangkok 10200
THAILAND
Tel: (+66) 2 697 4000
Fax: (+66) 2 697 4445
E-mail: Yongfan.piao@fao.org

Endorsement

Regional standards for phytosanitary measures are developed and adopted by the Asia and Pacific Plant Protection Commission as part of the plant protection programme of the Commission's contracting parties. This programme makes available to contracting and other interested parties regional standards for phytosanitary measures to support regional harmonization, with the aim to facilitate trade and avoid the use of unjustifiable measures as barriers to trade.

This standard was endorsed by the twenty-fifth session of the Asia and Pacific Plant Protection Commission in August 2007.



He Changchui
Assistant Director-General and
FAO Regional Representative for
Asia and the Pacific

CONTENTS

	<i>Page</i>
INTRODUCTION	2
Scope	2
References	2
Definitions and abbreviations	3
Outline of requirements	6
BACKGROUND	7
Purpose	8
REQUIREMENTS	8
Pest risk analysis on scale insects	8
1. Initiation	9
2. Pest risk assessment	9
2.1 Probability of entry	9
2.2 Probability of establishment	10
2.3 Probability of spread after establishment	11
2.4 Assessment of potential economic consequences	11
2.4.1 Direct pest effects	11
2.4.2 Indirect pest effects	12
Effect on trade	12
Impacts of eradication and control	12
Non-commercial and environmental	12
3. Pest risk management	12
3.1 Sourcing commodities from designated areas	13
3.1.1 Sourcing the commodity from a pest free area	13
3.1.2 Sourcing the commodity from a pest free place of production or pest free production site	13
3.1.3 Sourcing the commodity from an area of low pest prevalence	13

CONTENTS *(continued)*

	<i>Page</i>
3.2 In-field management for scale insects	13
3.3 Post-harvest management of scale insects	13
3.4 Pre-export phytosanitary inspection and possible remedial action	14
3.5 On arrival phytosanitary inspection and possible remedial action	14
3.6 Disinfestation	14
3.6.1 Methyl-bromide fumigation	14
3.6.2 Irradiation	15
3.6.3 Alternative treatments	15

Endorsement

This Asia and Pacific Plant Protection Commission (APPPC) Regional Standard for Phytosanitary Measures was endorsed by the twenty-fifth session of the APPPC held from 27 to 31 August 2007 in Beijing, China.

Review

APPPC Regional Standards for Phytosanitary Measures are subject to periodic review. The next review date for this standard is 2013. The standard may be reviewed earlier if the APPPC decides this is necessary.

Distribution

APPPC Regional Standards for Phytosanitary Measures are distributed by the Executive Secretariat of the APPPC to all APPPC members, the Administrative Heads of Regional Plant Protection Organizations and the FAO International Plant Protection Convention (IPPC) Secretariat. This standard is available on the APPPC webpage found within the International Phytosanitary Portal: <http://www.ippc.int/En/rppo/jsp>

INTRODUCTION

Scope

This standard provides guidelines for assessing the quarantine risks posed by scale insects of potential economic importance and the risk management measures that may be applied.

The scope of this standard is restricted to scale insects affecting fresh fruit and vegetables for human consumption moving in international trade, and excludes plants and plant products intended for propagation or processing.

References

Agreement on the application of sanitary and phytosanitary measures, 1994. World Trade Organization, Geneva.

Export certification system, 1997. ISPM No. 7, FAO, Rome.

Glossary of phytosanitary terms, 2006. ISPM No. 5, FAO, Rome.

Guidelines for inspection, 2005. ISPM No. 23, FAO, Rome.

Guidelines for the use of irradiation as a phytosanitary measure, 2003. ISPM No. 18, FAO, Rome.

Pest Risk Analysis for Quarantine Pests Including Analysis of Environmental Risks and Living Modified Organisms, 2004. ISPM No. 11 Rev. 1, FAO, Rome.

Requirements for the establishment of areas of low pest prevalence, 2005. ISPM No. 22, Rome.

Requirements for the establishment of pest free areas, 1995. 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.

The use of integrated measures in a systems approach for pest risk management, 2002. ISPM No. 14, FAO, Rome.

Ben-Dov Y, Miller DR, Gibson GAP (2005) ScaleNet. Available online at: <http://www.sel.barc.usda.gov/scalenet/scalenet.htm> (verified November 2006).

Gullan PJ (2001) Why the taxon Homoptera does not exist. *Entomologica* **33**, 101–104.

Definitions and abbreviations

ALOP*	Appropriate level of protection. The level of protection deemed appropriate by the member establishing a sanitary or phytosanitary measure to protect human, animal or plant life or health within its territory [WTO, 1994]
APPPC*	Asia and Pacific Plant Protection Commission
area	An officially defined country, part of a country or all or parts of several countries [FAO, 1990; revised FAO, 1995; CEPM, 1999; based on the World Trade Organization Agreement on the Application of Sanitary and Phytosanitary Measures]
consignment	A quantity of plants, plant products and/or other articles being moved from one country to another and covered, when required, by a single phytosanitary certificate (a consignment may be composed of one or more commodities or lots) [FAO, 1990; revised ICPM, 2001]
control (of a pest)	Suppression, containment or eradication of a pest population [FAO, 1995]
endangered area	An area where ecological factors favour the establishment of a pest whose presence in the area will result in economically important loss [FAO, 1995]
entry (of a pest)	Movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled [FAO, 1995]
establishment	Perpetuation, for the foreseeable future, of a pest within an area after entry [FAO, 1990; revised FAO, 1995; IPPC, 1997; formerly established]
FAO*	Food and Agriculture Organization of the United Nations
fresh	Living; not dried, deep-frozen or otherwise conserved [FAO, 1990]

fruits and vegetables	A commodity class for fresh parts of plants intended for consumption or processing and not for planting [FAO, 1990; revised ICPM, 2001]
infestation (of a commodity)	Presence in a commodity of a living pest of the plant or plant product concerned. Infestation includes infection [CEPM, 1997; revised CEPM, 1999]
inspection	Official visual examination of plants, plant products or other regulated articles to determine if pests are present and/or to determine compliance with phytosanitary regulations [FAO, 1990; revised FAO, 1995; formerly inspect]
intended use	Declared purpose for which plants, plant products, or other regulated articles are imported, produced, or used [ISPM No. 16, 2002]
interception (of a pest)	The detection of a pest during inspection or testing of an imported consignment [FAO, 1990; revised CEPM, 1996]
introduction	The entry of a pest resulting in its establishment [FAO, 1990; revised FAO, 1995; IPPC, 1997]
IPPC	International Plant Protection Convention, as deposited in 1951 with FAO in Rome and as subsequently amended [FAO, 1990; revised 1997]
ISPM	International Standard for Phytosanitary Measures [CEPM, 1996; revised ICPM, 2001]
National Plant Protection Organisation (NPPO)	Official service established by a government to discharge the functions specified by the IPPC [FAO, 1990; formerly Plant Protection Organization (National)]
official control	The active enforcement of mandatory phytosanitary regulations and the application of mandatory phytosanitary procedures with the

	objective of eradication or containment of quarantine pests or for the management of regulated non-quarantine pests [ICPM, 2001]
pathway	Any means that allows the entry or spread of a pest [FAO, 1990; revised FAO, 1995]
pest	Any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products [FAO, 1990; revised FAO, 1995; IPPC, 1997]
pest categorisation	The process for determining whether a pest has or has not the characteristics of a quarantine pest or those of a regulated non-quarantine pest [ISPM No. 11, 2001]
pest free area (PFA)	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 [FAO, 1995]
pest risk analysis (PRA)	The process of evaluating biological or other scientific and economic evidence to determine whether a pest should be regulated and the strength of any phytosanitary measures to be taken against it [FAO, 1995; revised IPPC, 1997]
pest risk assessment (for quarantine pests)	Evaluation of the probability of the introduction and spread of a pest and of the associated potential economic consequences [FAO, 1995; revised ISPM No. 11, 2001]
pest risk management (for quarantine pests)	Evaluation and selection of options to reduce the risk of introduction and spread of a pest [FAO, 1995; revised ISPM No. 11, 2001]
phytosanitary measure	Any legislation, regulation or official procedure having the purpose to prevent the introduction and/or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests [FAO, 1995; revised IPPC, 1997; ISPM, 2002]

protected area	A regulated area that an NPPO has determined to be the minimum area necessary for the effective protection of an endangered area [FAO, 1990; omitted from FAO, 1995; new concept from CEPM, 1996]
quarantine pest	A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled [FAO, 1990; revised FAO, 1995; IPPC 1997]
regional standards (RSPM)	Standards established by a Regional Plant Protection Organization for the guidance of the members of that organization [IPPC, 1997]
spread	Expansion of the geographical distribution of a pest within an area [FAO, 1995]

* Indicates terms which are not included in ISPM No. 5 *Glossary of phytosanitary terms*. All other terms are present in ISPM No. 5.

Outline of requirements

Guidelines for a PRA on scale insects associated with fresh fruits and vegetable in international trade for human consumption include the consideration of aspects of initiation, assessment of probability of introduction and spread and the assessment of potential economic consequences. Options for risk management include sourcing the commodities from pest free areas, in-field management of the insects, areas of low pest prevalence, pre-export or on arrival phytosanitary inspection and possible remedial action, and disinfection.

This standard is complementary to ISPM No. 11, *Pest Risk Analysis for Quarantine Pests Including Analysis of Environmental Risks and Living Modified Organisms*, and other relevant standards.

BACKGROUND

The higher taxonomy of scale insects (Hemiptera: Coccoidea) is under debate. They are generally considered in the Order Hemiptera, Suborder Sternorrhyncha, and Superfamily Coccoidea (Gullan 2001).

There are an estimated 7355 species of scale insect in 1050 genera and 28 families. Three families account for an estimated 6073 of these species. These are the Diaspididae (2409), Pseudococcidae (2215) and Coccidae (1149) (Ben-Dov *et al.* 2005).

A number of scale insects are well known as quarantine pests. Several of these species are distributed widely and are established in a range of production areas, whereas others have limited geographic distributions.

Scale insects are regularly detected upon plant and plant product commodities in international trade. Detection of scale insects on these commodities may result in phytosanitary measure(s) being applied.

Whilst evidence is limited, it is considered that the spread of many of these species has been mainly through the unregulated trade of propagative plant materials and plants (nursery stock), rather than via regulated trade in fresh fruits and vegetables for human consumption.

Although scale insects generally have limited mobility, they may be transferred passively by animal and human activities (e.g. transport of contaminated equipment and plant material) and by wind. The presence of scale insects on the pathway of commodities for human consumption provides a restricted opportunity for these pests to establish and spread compared to that associated with nursery stock. The developmental biology of scale insects may be a factor that mitigates phytosanitary risk.

ISPM No. 11, *Pest risk analysis for quarantine pests including analysis of environmental risks and living modified organisms*, 2004 provides guidance for undertaking a pest risk analysis (PRA) to determine the quarantine status of a given pest. It describes the integrated processes to be used for risk assessment as well as the selection of risk management options. This standard supplements ISPM No. 11 in regard to PRA for scale insects.

Purpose

Certain scale insects may be important pests on specific commodities for some countries, but evaluation of the probability of introduction and spread of these pests and of the associated economic consequence may conclude that they may not establish or spread on commodities for human consumption. The critical factor supporting this conclusion is their low mobility of the scale insect and the fact that the host is likely to be consumed and the skin either eaten or discarded relatively soon after harvest. The combination of these factors is likely to provide few opportunities for establishment or spread for scales of low mobility associated with commodities for human consumption.

This standard provides guidelines for considering the risk from scale insects on the pathway associated with fresh fruit and vegetables for human consumption. It provides guidelines on:

- assessing the potential for scale insects to enter, establish and spread, and the likely consequences to the PRA and/or endangered area by identification of biological traits of scale insects that are pertinent to the risk assessment.
- identifying possible phytosanitary measures to manage identified risks from scale insects.

REQUIREMENTS

Pest risk analysis on scale insects

The objectives of a PRA are, for a specified area, to identify pests and/or pathways of quarantine concern and evaluate their phytosanitary risk, to identify endangered areas, and, if appropriate, to identify risk management options. In accordance with ISPM No. 11, a PRA has three distinct stages:

- Stage I – Initiation
- Stage II – Pest risk assessment
- Stage III – Pest risk management

1. Initiation

Stage I, initiation, involves identifying the pest(s) and pathway(s) that are of quarantine concern and should be considered for risk analysis in relation to the identified PRA area. In this standard the pests are identified as scale insects associated with the importation pathway for fresh fruit and vegetables for human consumption.

2. Pest risk assessment

Stage II, pest risk assessment, begins with the categorization of individual pests to determine whether the criteria for a quarantine pest are satisfied. Risk assessment continues with an evaluation of the probability of pest entry, establishment, and spread, and of their potential economic consequences (including environmental consequences).

2.1 Probability of entry

In determining the likelihood that a given species will enter, in a viable state, the PRA area with the importation of fresh fruit and vegetable for human consumption, consider:

- prevalence of the pest in the source area
- how the pest is associated with the commodity (e.g. the life-stage is involved)
- seasonal timing (e.g. seasonal fluctuations in pest prevalence) for importation
- the commercial pest management applied, including packing house procedures and commercial production procedures (e.g. field hygiene, washing and quality inspections)
- probability of survival during transport or storage; duration and conditions of transport (i.e. would the species biology support suggest importation in a viable form)
- whether the imported commodity is to be sent to a few or many destination points
- the intended use of the commodity (i.e., restricted to human for consumption in this standard)

- the risks associated with disposal of by-products and waste
- probability of transfer to a suitable host, taking account of pest mobility and host availability in the area
- the volume and frequency of movement along the pathway

For scale insects it is important to consider:

- mobility between hosts, within the canopy of host crops in production areas and capacity to transfer onto and from the pathway (the means by which a pest may establish and spread)
- presence of sessile development stages and fixed feeding habits
- that mobility is restricted to specific development stages
- that association of a given scale insect with a host may not necessarily mean presence on the pathway for the commodity
- the risk from passive distribution mechanisms

2.2 Probability of establishment

In determining the likelihood that a given species will establish in the PRA area following entry consider:

- availability, quantity and distribution of potential hosts (polyphagous species have the greater potential for establishment)
- environmental suitability
- potential for adaptation of the pest
- reproductive capacity and mode of reproduction (e.g., sexual, parthenogenesis)
- commercial cultural practices and control measures that are used

For scale species it is important to consider:

- probability of transfer from the imported commodity to a potential host, taking into account that the mobility of the scale insect may be limited

2.3 Probability of spread after establishment

In determining the likelihood that a given species of scale insect will spread in the PRA area following entry and establishment consider:

- suitability of the environment for natural spread of the pest
- presence of natural barriers
- potential for pest movement with the commodity
- intended use of the commodity (human consumption)
- potential vectors of the pest in the PRA area
- potential natural enemies of the pest in the PRA area

For scale insects it is important to consider:

- ability to transfer between potential hosts
- extent of overlap in host plant range and environmental conditions between export and import countries
- reproductive capacity and mode of reproduction (e.g. sexual, parthenogenesis)
- potential competition from native fauna
- genetic plasticity and adaptability to new conditions (i.e. demonstrated establishment and spread of the species beyond its geographical origin)
- frequency of movement of host commodity within a country

2.4 Assessment of potential economic consequences

2.4.1 *Direct pest effects*

The direct effects of scale insects on host plant life or health should be assessed. Considerations may include: potential host plants; the pest's rate of spread and reproduction; degree of damage; and changes in yields.

Scale insects can cause direct harm to a wide range of host plants, affecting plant health as well as fruit quality. Scale insects feed on sap by means of long feeding stylets. Once feeding commences, they usually remain attached to the host plant permanently.

2.4.2 Indirect pest effects

Effect on trade

Assessment may include effects on the domestic market and/or international market access. Additional effects may include changes in consumer demand for affected commodities.

Indirect pest effects are those effects that are not host-specific. Certain species of scale insects may secrete honeydew, so sooty mould growth or attendances by ants may be issues of concern.

Impacts of eradication and control

The impact of eradication and control may include the cost of control measures and the effects on production systems such as those on organic production systems. Assessment may also include changes to production costs.

Non-commercial and environmental

Assessment of the effects on the environment may include changes in plant community structure, and impacts on endangered flora and may include effects on non-market values (e.g. amenity or ecosystem stability, biodiversity).

3. Pest risk management

Stage III, pest risk management, is the evaluation, selection and application of measures to mitigate the risk associated with the entry, establishment and spread of quarantine pests.

If the risk associated with scale insects is determined to be above a country's Appropriate Level of Protection (ALOP) for fresh fruit and vegetables for human consumption, phytosanitary measures may be applied. Assessment should be given to the efficacy, feasibility and impact of these measures in order to select the most appropriate measures that are least trade restrictive and have minimal impact on the environment.

The following phytosanitary measures are proposed to mitigate this risk, but this does not exclude any equivalent measures.

The following measures may be applied singly or as part of a systems approach as set out in ISPM No. 14, *The use of integrated measures in a systems approach for pest risk management*.

3.1 Sourcing commodities from designated areas

3.1.1 Sourcing the commodity from a pest free area

The requirements for establishing pest free areas are set out in ISPM No. 4, *Requirements for the establishment of pest free areas*.

3.1.2 Sourcing the commodity from a pest free place of production or pest free production site

The requirements for establishing pest free places of production or pest free production sites are set out in ISPM No. 10, FAO, *Requirements for the establishment of pest free places of production and pest free production sites*, 1999.

3.1.3 Sourcing the commodity from an area of low pest prevalence

The requirements for establishing areas of low pest prevalence are set out in ISPM No. 22, *Requirements for the establishment of areas of low pest prevalence*.

3.2 In-field management for scale insects

Production areas may be registered with the NPPO of the exporting country to produce commercial export-grade commodity and manage in-field the scale insects identified as being of quarantine concern. In-field management measures may include control of these pests during production.

3.3 Post-harvest management of scale insects

Packing houses may be registered with the NPPO of the exporting country to undertake post-harvest specific phytosanitary procedures that may be required to manage the pest risk of specific life stages of specific pests.

3.4 Pre-export phytosanitary inspection and possible remedial action

Consignments may be inspected pre-export by the exporting country's NPPO or delegated authority (under a bilaterally agreed arrangement) or by the importing NPPO under a pre-clearance arrangement.

Inspection of the commodity is to be completed after commercial grading, sanitation, and pre-export disinfestation treatment (if applicable). Commodities for export should comply with all risk management measures identified by the PRA. The detection of scale insects that are quarantine pests for the importing country during pre-export inspection may result in remedial action including withdrawal of the consignment from export.

3.5 On arrival phytosanitary inspection and possible remedial action

On arrival each consignment that had not been inspected prior to export (either in accordance with a bilateral arrangement or through a pre-clearance programme) should preferably be inspected at the first port of entry. Inspection of the commodity should be conducted in accordance with ISPM No. 23, *Guidelines for inspection*, 2005.

No detection of pests by inspection of the consignment provides a measure of confidence that the required measures have been effectively implemented in the exporting country and that the consignment is free of pests of quarantine concern.

Consignments accompanied with appropriate documentation from either a pre-export inspection or pre-clearance programme should only require document verification and standard import procedures (in relation to scale pests).

3.6 Disinfestation

Efficacious disinfestation treatments may be considered as effective measures, for example:

3.6.1 Methyl-bromide fumigation

Following commercial grading and sanitation procedures, consignments of the commodity may be fumigated with methyl-bromide. This may occur either

pre-export or on arrival. The fumigation methods should be determined through pest risk analysis including identified risks and relevant established treatment standards or conditions established under a bilateral arrangement.

3.6.2 Irradiation

Guidance on the use of irradiation as a phytosanitary measure are set out in ISPM No. 18, *Guidelines for the use of irradiation as a phytosanitary measure*, 2003.

3.6.3 Alternative treatments

Alternative treatments with proven efficacy as measures against scale insects may be considered.