DRAFT ANNEX TO ISPM 39: Use of systems approaches in managing the pest risk associated with the movement of wood (2015-004)

Status box

This is not an official part of the standard and it will be modified by the IPPC Secretariat after adoption.	
Date of this document	2024-12-02
Document category	Draft annex to ISPM 39
Current document stage	*To* CPM-19 (2025) for adoption
Major stages	2017-04 CPM-12 added topic *Use of systems approaches in managing risks associated with the movement of wood commodities* (2015-004), priority 3. 2018-11 Standards Committee (SC) approved Specification 69 (*Use of systems approaches in managing the pest risks associated with the movement of wood*). 2022-06 Expert working group drafted the annex. 2023-05 SC revised and approved for consultation. 2023-07 First consultation. 2024-05 SC-7 revised and approved for second consultation. 2024-07 Second consultation. 2024-10 Steward revised. 2024-11 SC revised and approved for adoption.
Steward history	2021-11 SC Steve CÔTÉ (CA, Lead Steward) 2022-05 SC Harry ARIJS (EU, Assistant Steward) 2021-11 SC Sophie PETERSON (AU, Assistant Steward) 2019-05 SC Rajesh RAMARATHNAM (CA, Lead Steward)
Notes	2022-07 Edited 2023-05 Edited 2024-06 Edited 2024-12 Edited

This annex was adopted by the XXX Session of the Commission on Phytosanitary Measures in XXX 20XX.

The annex is a prescriptive part of the standard.

CONTENTS

INTRODUCTION

Scope

This annex provides guidance to national plant protection organizations (NPPOs) on the use of specific integrated measures that, when applied together, reduce the pest risk posed by quarantine pests associated with the international movement of wood. This annex applies to the wood of gymnosperms and angiosperms, as described in the core text of this standard, and relates to quarantine pests associated with wood and their specific locations within the wood. It identifies examples of specific practices, procedures and regulatory actions that may be applied as integrated measures in a systems approach, from pre-planting to post-import of wood, to meet phytosanitary import requirements. It also details the documentation required to demonstrate that measures have been applied. The responsibilities of NPPOs and participating entities in developing, implementing and supervising the systems approach are described.

Background

Countries predominantly rely on treatments and processing to manage the pest risk associated with the movement of wood commodities across their borders. A systems approach can provide an alternative to single phytosanitary measures to meet the phytosanitary import requirements of an importing country. By doing so, a systems approach may provide countries with additional opportunities to facilitate or expand trade while effectively managing pest risk.

Any systems approach for wood commodities should be developed in accordance with ISPM 14 (*The use of integrated measures in a systems approach for pest risk management*).

REQUIREMENTS

1. General considerations for developing a systems approach for wood commodities

Development of a systems approach for wood commodities requires knowledge of the biology of the pests associated with the wood commodities (Appendix 1 to this annex), the geographical distribution and host range of the pests, and the production chain of the commodities, including the post-harvest treatments or processing that are applied. Specific practices, procedures and regulatory actions to be included as measures in the systems approach should be effective and feasible. The selection of the measures in the systems approach should be agreed upon by the NPPO of the importing country and the NPPO of the exporting country.

Good forestry practices should be one of the basic requirements for implementing a systems approach for wood commodities. Because of the long production cycle of wood, the pest status of the area of production can change. This means that some measures (e.g. those applied before planting or during the early stages of plant growth) may be less relevant in a systems approach for wood commodities than in systems approaches for other commodities.

2. Practices, procedures and regulatory actions that can reduce pest risk

Practices, procedures and regulatory actions that can reduce pest risk, related to activities in an exporting country from pre-planting to transport, are described in Table 1. These may be included as integrated measures in a systems approach.

Table 1. Examples of pre-import practices, procedures and regulatory actions that may be used in a systems approach for wood commodities

Pre-planting	
Site selection	Pre-planting assessments, including determining the site suitability for the host species and pests of concern, may be used to avoid planting in unsuitable conditions. Planting in areas where a pest is absent as described in ISPM 8 (*Determination of pest status in an area*) or at low pest prevalence as described in ISPM 22 (*Requirements for the establishment of areas of low pest prevalence*) may be used.
Drainage	Tillage to improve drainage before planting may be used to reduce pest populations.
Species and cultivar selection	Planting species and cultivars of trees that are appropriate for the particular region, soil and climatic conditions can reduce plant stress and susceptibility to pests. Planting forests with mixed species rather than using monoculture stands or clonal trees can reduce the vulnerability of forests to pests.
Use of resistant genotypes	Planting genotypes that are resistant to certain pests can reduce infestation.
Pre-harvest	
Silvicultural practices	Planning and operational practices that can result in pest risk reduction may be applied to both planted and naturally regenerated forests. Post-planting assessments may be conducted to regularly review the progress of planted seedlings. Pruning may be carried out to remove unhealthy or infested branches. Thinning may be used to improve spacing, reduce competition and improve tree health. Similarly, roguing (routine removal of trees that show evidence of infestation, off-type characteristics or undesirable traits) reduces pest incidence, improves harvest quality and reduces the risk of exporting infested wood. Well-planned and managed forests provide an opportunity to improve and regularly check tree health while optimizing timber production. Any equipment used to perform these practices should be cleaned before and after if there is a risk that such practices could contribute to the introduction and spread of pests.
Field inspection (section 2.4 of this standard)	Data from field inspections and regular forest inventories (e.g. observations of pests or signs of pests) may be used to identify infested trees and guide harvest-planning decisions and to help ensure that infested trees are not selected for export.
Surveillance	Surveillance may be used for early detection and intervention in the case of a pest outbreak or to confirm pest status (ISPM 8). Surveillance should be conducted in accordance with ISPM 6 (*Surveillance*).
Application of semiochemicals	Semiochemicals may be used to reduce pest populations (via techniques such as trapping as well as pest-mating disruption) or to check for pest presence to ensure early detection. Synthetic anti-aggregation pheromones (chemical substances that interrupt pest aggregation on a host) may be used to reduce pest populations or protect healthy tree stands that may be susceptible to pests.
Application of pesticides	Pesticides may be used to reduce pest incidence.
Biological control	Biological control agents may be used to reduce pest incidence.
Harvest	

Timing of harvest	In some situations, infestation by a particular pest can be reduced by altering the timing of the harvest. Some pests, such as bark beetles and ambrosia beetles, are seasonal in temperate forests. For a seasonal pest, it may be feasible to identify the ideal timing of harvest to reduce levels of attack by the pest and therefore infestation. This may not be possible in tropical forests. In tropical forests, pests can have multiple overlapping generations throughout the year or year-round activity with peak levels of activity in the dry or wet season. The age of the trees at harvest can also be a factor that affects pest populations.
Post-harvest	
Rapid removal, appropriate means of transport and timely transport of harvested round wood	Round wood can be susceptible to infestation after it has been harvested. The season of harvest, the length of time that the round wood remains in the forest after harvesting, and the length of time that it takes to transport the wood to the processing facility or holding yard can influence post-harvest infestation. The transport of round wood on the platform of a vehicle can reduce soil contamination. In regions where the temperature during harvest, post-harvest, transport and storage is below −15 °C, the cold temperature may reduce the pest risk.
Visual examination for pests during volume and quality determination	To reduce the likelihood or quantity of infested wood entering the production chain, round wood may be visually examined for evidence of pests during the process of scaling and grading.
Application of repellents	Repellents (including synthetic anti-aggregation pheromones), if available, may be used to repel pests from places of natural disturbance (e.g. windthrows) or logging and storage areas.
Protection of round wood after harvest	Protection of round wood after harvest (e.g. storing in water, sprinkling with water, insect nets, pesticides) may be used to prevent post-harvest infestations by bark beetles and wood borers.
Removal of bark (section 2.1 of this standard)	Removal of bark substantially reduces the number of pests inhabiting the outer surface and those found directly beneath the bark. Bark removal can also prevent post-harvest infestation by some pest species.
Removal of branches (or boughs)	Branch (or bough) removal can be an effective method to reduce infestation by pests of foliage and twigs, thus preventing the movement of those pests.
Washing or water-blasting	Washing or water-blasting can remove pests and soil.
Processing and treatment	
Rapid processing of round wood	Rapid processing of wood after harvest can reduce the risk of post-harvest infestation.
Removal of bark (section 2.1 of this standard)	Removal of bark substantially reduces the number of pests inhabiting the outer surface and those found directly beneath the bark. Bark removal can also prevent post-harvest infestation by some pest species.
Sawing and planing wood (section 1.2 of this standard)	The process of sawing wood can remove insect pests present in the wood and render it less suitable for pest survival. The presence or absence of bark and the thickness of a piece of sawn wood affect pest risk. Sawn wood with rounded edges resulting from the curvature of the round wood poses a greater pest risk than square-edged sawn wood, as a larger percentage of the wood just below the surface of the bark is included. Planing reduces the dimensions of sawn wood and may be used to remove residual bark.
Quality control of sawn wood	During grading of sawn wood and quality control, wood with insect galleries or fungal infection may be removed from the production chain or marked for treatment.
Inventory and contamination management	Post-harvest inventory management and keeping storage and processing areas free from pests, wood debris and soil play an important role in reducing infestation. Segregation of wood into different pest risk categories at appropriate stages of the production chain may be an important component of a systems approach.
Selecting processing sites where pest status is	The pest risk posed by a particular pest can be reduced by processing wood commodities in areas where the pest is absent as described in ISPM 8 or at low prevalence as described in ISPM 22.

"absent" or "present: at low prevalence"	
Trapping	Trapping may be conducted within and around a storage and processing facility, allowing for early detection of a pest.
Lighting	Lighting used in storage areas can be very attractive to wood pests. Use of lighting frequencies that are less attractive to wood pests or push–pull lighting to divert pests can reduce infestation.
Visual examination of wood commodities	Visual examination may be used to identify specific signs or symptoms of pests and determine if measures applied have been effective. The size and disposition of the wood commodities and the cryptic nature of some pests can, however, make visual examination challenging or not effective.
Chipping (section 1.3.1 and section 2.3 of this standard)	The pest risk associated with wood chips varies depending on the tree species, presence of pests in the original material, bark content, chip size and intended use (i.e. fuel, landscape mulch, or pulp for fibre production). Commercial specifications for chip quality related to specific intended uses may be used to reduce pest risk. For example, chips for fibre production have minimal bark, consistent moisture content and uniform shape and size, resulting in low pest risk for some pests compared with chips used as a bioenergy source that can have greater variation in size and can contain bark. The process of wood chipping or grinding is lethal to many insect pests; the process can destroy living organisms or disrupt the host material so that the insect cannot complete its life cycle. Chipping into small pieces is an effective method of reducing populations of wood borers (e.g. cerambycids) in wood chips. Chip piles can generate heat to destroy pests if managed correctly.
Heat treatment (section 2.2 of this standard)	Heat treatment involves heating wood to kill, or otherwise cause sublethal effects. Heat treatment does not necessarily involve moisture reduction. Types of heat treatments include, but are not limited to, steam, hot-water bath and vacuum-steam heating, kiln-heating, solar heating, joule heating and dielectric (microwave or radio-frequency) heating. Establishment of technical standards for heat treatment schedules and approval of facilities by NPPOs should be in accordance with ISPM 42 (*Requirements for the use of temperature treatments as phytosanitary measures*).
Air-drying (section 2.2 of this standard)	Air-drying wood to the equilibrium moisture content can prevent some pests from completing their life cycle and make it unattractive for some pests, because of the reduction in moisture content.
Kiln-drying (section 2.2 of this standard)	Kiln-drying can prevent some pests from completing their life cycle in wood commodities, because of the heat exposure and reduction in moisture content.
Irradiation (section 2.2 of this standard)	Irradiation may be used as a pest risk reduction measure during or after processing of wood commodities. Irradiation should be applied in accordance with ISPM 18 (*Requirements for the use of irradiation as a phytosanitary measure*).
Fumigation (section 2.2 of this standard)	Fumigation may be used as a pest risk reduction measure to treat wood commodities. Some phytosanitary treatments using fumigants are described in ISPM 28 (*Phytosanitary treatments for regulated pests*) and some are described in ISPM 15 (*Regulation of wood packaging material in international trade*). Fumigation should be applied in accordance with ISPM 43 (*Requirements for the use of fumigation as a phytosanitary measure*).
Spraying or dipping (section 2.2 of this standard)	Wood commodities may be treated with anti-fungal sap-stain chemical spray or dips to prevent the growth of stain fungi on logs or sawn wood.
Modified atmosphere treatment (section 2.2 of this standard)	Wood commodities may be exposed to a modified atmosphere as a pest risk reduction measure. Modified atmosphere treatment should be applied in accordance with ISPM 44 (*Requirements for the use of modified atmosphere treatments as phytosanitary measures*).
Pre-dispatch	
Limiting the storage time	Limiting the time that wood commodities are stored before dispatch reduces opportunities for post-harvest infestation.

Storage-area segregation	Wood commodities may be segregated or stored in a manner designed to prevent infestation. This may be achieved by covering, containerizing, or storing in buildings where pheromone traps are deployed.
Storage-area cleanliness	Keeping storage areas clean and free from pests, wood debris and soil can help to prevent infestation of commodities.
Pre-dispatch protection	A storage enclosure can be very effective at protecting wood commodities from infestation before dispatch. As contact with the ground can risk commodities becoming infested with soil-borne pests, storing commodities on cement pads or raised platforms can be beneficial. Regular checks for pests combined with measures to prevent or deter pests (e.g. host removal, reduction or altering of facility lighting, pesticide application, use of nets (including those treated with insecticide), wrapping in protective material), may be used to protect wood commodities during storage and loading.
Water application	Round wood may be sprinkled with water in storage areas (where appropriate) to reduce pest infestation and water pressure-washing may be used to remove pests, soil and debris.
Chemical treatment (section 2.2 of this standard)	To prevent pests from infesting wood commodities, chemical treatments may be applied.
Verification of pest presence or absence	In the outer perimeter of the storage area, push–pull systems with synthetic pheromones and traps may be used to check whether insects are present in and around the storage area and to manage them.
Packaging	Packaging (including wrapping) may be used to prevent infestation, contamination and damage by the weather before and during transport.
Pre-dispatch inspection (section 2.4 of this standard)	To ensure that the phytosanitary import requirements of the importing country are met, inspection may be conducted at various points within a systems approach.
Sampling for laboratory testing and pest identification (section 2.4 of this standard)	When the identity of microscopic organisms such as fungi and nematodes on the outer surfaces of wood, or within the wood, cannot be confirmed through inspection, wood tissues may be collected according to methods approved by NPPOs and the pest species determined in the laboratory.
Transport	
Timing of dispatch	Dispatching wood commodities only when pests are inactive can be effective in reducing pest risk.
Protection during transport	Wood commodities may be protected during transport (e.g. by covering them, wrapping them, or sealing them in closed containers) to reduce infestation by pests during transport.
Treatment during transport	Wood commodities may be treated in either containers or ship holds during transport. The type of treatment that is appropriate depends on the type of container required or available, the expertise needed, shipping laws (including occupational and health requirements), the wood commodities being transported and the phytosanitary import requirements of the importing country.
Planned transport routes	The choice of transport route can affect pest risk. Pest risk may be reduced by choosing a route based on the known distribution and phenology of pests associated with the wood commodities being transported and the weather and climatic conditions during transport.
Cleaning conveyances	Cleaning of conveyances before loading or after unloading reduces infestation of wood commodities by pests from previous cargoes.

Note: NPPO, national plant protection organization.

Sources cited: ISPMs are available at https://www.ippc.int/core-activities/standards-setting/ispms

When applicable and feasible, some of the practices, procedures or regulatory actions described in Table 1 may be applied at different parts of the production chain or as post-import measures. In addition, practices, procedures or regulatory actions that are specific to the post-import part of the production chain may be employed as components of a systems approach, if agreed upon by the NPPO of the importing country and the NPPO of the exporting country (Table 2).

Table 2. Examples of post-import practices, procedures and regulatory actions that may be used in a systems approach for wood commodities

Storage in an importing country	A systems approach may include provisions for wood-commodity storage that are designed to prevent pest escape from storage areas, infestation and contamination.
Treatment on arrival	Treatment on arrival may be included as part of a systems approach.
Inspection on arrival	Inspection on arrival may be used to verify that wood commodities meet the phytosanitary import requirements of the importing country. Inspections should be conducted in accordance with ISPM 23 (*Guidelines for inspection*).
Limiting the intended use (section 3 of this standard)	The intended uses of the wood commodities being imported may be stipulated in a systems approach. The systems approach may be set up for a particular intended use, such as wood chipping (as wood chipping effectively reduces potential infestation by wood borers), and this intended use may also determine the measures to be applied along the production chain and result in a different pest risk compared to other intended uses.
Limiting the time before processing	Some wood commodities may only be suitable for storage and processing within a certain time frame on arrival via an NPPO-approved system for a particular pest (e.g. chipping and pelleting of wood on arrival).
Limiting the points of entry and distribution	Specific points of entry or restrictions on the distribution of wood commodities after import (e.g. permitting initial movement only to a treatment facility) may be stipulated in a systems approach. The importing country shall publish a list of such points of entry (Article VII.2(d) of the IPPC).

Notes: NPPO, national plant protection organization.

Sources cited: ISPMs are available at https://www.ippc.int/core-activities/standards-setting/ispms

IPPC Secretariat. 1997. *International Plant Protection Convention*. IPPC Secretariat. Rome, FAO. https://www.ippc.int/en/about/convention-text/

3. Designing a systems approach for wood commodities

When designing a systems approach, the NPPO of the exporting country should select appropriate practices, procedures and regulatory actions, for example from those described in Table 1 and Table 2, and propose these to the NPPO of the importing country along with an explanation of how these practices, procedures and regulatory actions would reduce the pest risk associated with wood commodities to meet the phytosanitary import requirements of the importing country. The NPPO of the importing country should evaluate whether the proposed measures meet its phytosanitary import requirements. The NPPO of the importing country may request scientific evidence from the NPPO of the exporting country regarding the effectiveness and feasibility of the proposed measures.

Consideration of best practices and standards used by industry to produce wood commodities may promote the development of the systems approach in a way that is feasible for, and acceptable to, both the exporting and the importing country. National plant protection organizations are encouraged to engage industry in the early stages of the development of the systems approach.

4. Responsibilities for implementation of a systems approach for wood commodities

4.1 Responsibilities of NPPOs

The responsibilities of the NPPOs participating in a systems approach are described in ISPM 14. In addition, in a systems approach for wood commodities, the responsibilities should include, but are not limited to, the following:

- documenting and agreeing the systems approach;
- communicating the phytosanitary import requirements of the importing country and the requirements, specifically, of the systems approach for wood commodities, to all participating entities;
- documenting and agreeing to compliance procedures;

- determining the necessary corrective actions and conducting follow-up audits when nonconformities have been detected;
- reviewing the requirements or the design of the systems approach to address nonconformities, in order to prevent recurrence of the failures identified;
- confirming whether the importing country requires entities to be authorized to participate in the systems approach;
- ensuring that any entities that are required to be authorized are authorized in accordance with ISPM 45 (*Requirements for national plant protection organizations if authorizing entities to perform phytosanitary actions*); and
- ensuring that the systems approach is audited in accordance with ISPM 47 (*Audit in the phytosanitary context*).

4.2 Responsibilities of entities participating in the systems approach

The authorized entities participating in the systems approach, whether in the importing or exporting country, should conform with the requirements of ISPM 45.

5. Documentation

To facilitate the successful implementation and effective communication of a systems approach for wood commodities, documents should include a description of the NPPOs' requirements for the systems approach, the procedures for implementing the systems approach and the records of its implementation.

5.1 Description of systems approach requirements

The NPPOs should produce a description of the requirements for the systems approach. This description should cover aspects including, but not limited to:

- the scope and purpose of the systems approach;
- the measures to be applied;
- the responsibilities of the NPPOs and participating entities; and
- traceability.

5.2 Implementation procedures documented by participating entities and NPPOs

Documented procedures, for example production manuals or standard operating procedures, should describe the actions, elements, processes and operational systems that make up the measures applied by participating entities and NPPOs. The documented procedures should include:

- a description of the organizational structure and responsibilities of the personnel involved in implementing the systems approach;
- training procedures used to ensure the competency of personnel responsible for implementing the systems approach;
- a description of the measures (e.g. measures selected from Table 1 and Table 2), how they will be applied as part of the systems approach, and how they meet the phytosanitary import requirements of the importing country;
- procedures associated with maintaining records of the measures applied in the systems approach and ensuring traceability; and
- procedures used to record, address and correct nonconformities that may occur (e.g. corrective actions).

5.3 Records that demonstrate implementation

The NPPOs and participating entities should record the measures that have been applied in implementing the systems approach and should retain these records for auditing purposes to demonstrate the implementation of the systems approach. The retention time of these records should be agreed upon by the NPPO of the importing country and the NPPO of the exporting country.

6. Traceability

Participating entities in a systems approach should ensure that adequate records are retained to allow traceability in relation to all critical control points along the wood-commodity production chain.

7. Evaluating the effectiveness of a systems approach for wood commodities and its component measures

Guidance on evaluation methods can be found in ISPM 14.

8. Further reading

Information to support the implementation of this annex may be available on the IPP at https://www.ippc.int/en/about/core-activities/capacity-development/guides-and-training-materials/.

This appendix is for reference purposes only and is not a prescriptive part of the standard.

APPENDIX 1 TO ANNEX [X]: Major wood pests grouped according to where they live and reproduce

Pests associated with trees can be grouped according to the plant tissues they use to live and reproduce. They include pests that live and reproduce in the following locations: on, in or just under the bark; in wood tissue under the bark; and in foliage and twigs.

Pests on or in the bark or just under the bark in the cambium

Certain species of insects, fungi and nematodes live on or in the bark or immediately under the bark in the cambium:

- **Bark beetles** (Coleoptera: Curculionidae: Scolytinae, except Corthylini, Xyleborini and Xyloterini) – The members of this highly diverse subfamily spend most of their life cycle under the bark of their host trees, foraging on the inner bark (phloem).
- **Scale insects, mites, aphids, adelgids, non-wood-boring moths and wasps** – These pests may be present on or in the bark or immediately under the bark in the cambium.
- **Fungi and oomycetes** (e.g. *Phytophthora* species) – Many fungal pests, including stem rusts and canker fungi, grow and sporulate in close association with bark and phloem tissues. These pests may be present on the outer surfaces of some wood commodities.
- **Nematodes** – Pathogenic nematodes may be found just under the bark (e.g. phoretic nematodes associated with beetles may be found in the inner bark layer).

Pests associated primarily with wood tissue under the bark

Certain species of insects, fungi and nematodes live primarily in wood tissue under the bark:

- **Ambrosia beetles** (Coleoptera: Curculionidae: Scolytinae (Corthylini, Xyleborini, Xyloterini) and Platypodinae) – These beetles may be found in the inner bark (phloem) and xylem.
- **Wood borers** (Coleoptera: Cerambycidae, Curculionidae, Buprestidae; Diptera: Pantophthalmidae; Hymenoptera: Siricidae; Lepidoptera: Cossidae and Sesiidae; and Isoptera) – Most of the life stages of these insects occur in the phloem and xylem.
- **Fungi** – Many fungal species inhabit the woody portion of tree stems. The success, location and extent of fungal colonization is largely governed by the nutritional requirements of the fungi, the physical characteristics of the wood (chemical composition, pH, cell structure, etc.), the wood moisture, the temperature and the presence of competing organisms. Decay fungi and vascular wilt fungi may be present throughout the wood or, depending on the species, may be restricted to the sapwood (xylem) or heartwood. Most canker and rust infections of trunk wood are restricted to the outer few centimetres of wood.
- **Nematodes** – Pathogenic nematodes (Nematoda: e.g. *Bursaphelenchus cocophilus* (Cobb, 1919) Baujard, 1989, *Bursaphelenchus xylophilus* (Steiner & Bührer, 1934) Nickle, 1970) live primarily in the sapwood (xylem).

Pests primarily associated with foliage and twigs

Although foliage and twigs are not a major wood commodity, many forest pests live and reproduce in these plant tissues, either exclusively or at certain points in their life cycle:

- Pests that live in and on foliage may include, but are not limited to, adelgids, ants, aphids, flies, moths, nematodes, scale insects and wasps.
- Twig borers may be found in small branches that are large enough to allow these pests to complete their life cycle.
- Spores of fungi and fungus-like organisms may be present on outer surfaces, as on all other forest commodities.