



[1] **Movement of growing media in association with plants for planting in international trade (2005-004)**

[2] **Publication history**

[3]

<b>Date of this document</b>	2013-05-08
<b>Document category</b>	Draft ISPM
<b>Current document stage</b>	2013-05 SC approved for MC
<b>Major stages</b>	2004-11 Standards Committee (SC) recommended topic Soil and growing media (2005-004) be added to the work programme 2005 ICPM-7 added topic: Soil and growing media (2005-004) to the Work programme 2007-05 SC approved Specification 43 2010-06 Expert working group drafted text 2011-05 SC commented on draft ISPM (returned to steward for review in consultation with a small group of SC members) 2011-11 SC discussed topic briefly because no redraft was available 2012-11 SC assigned new steward and new assistant steward 2013-01 Steward revised draft in consultation with a small group of SC members 2013-05 SC revised in meeting and approved for member consultation 2013-07 Submitted for member consultation
<b>Steward history</b>	2005-04 SC Katbeh-Bader, Mohammad (JO) 2008-11 SC Forest, Marie-Claude (CA) 2012-11 SC Paulsen, Hilde (NO, Lead), Dikin, Antario (ID, Assistant)
<b>Secretariat notes</b>	2011-02 Document from EWG, formatted for editor 2011-02 Edited 2013-01 New steward revised draft 2013-01 Sent to editor 2013-02 Technical Panel for the Glossary (TPG) reviewed and provided comments 2013-02 Edited 2013-03 Posted for 2013-05 SC 2013-05 After SC revisions, text reviewed by Steward (HP) and prepared for editor 2013-05 Edited

[4] **CONTENTS [to be inserted]**

[5] **Adoption**

[6] This standard was adopted by the Commission on Phytosanitary Measures in [Month 201-].

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[7] **Introduction**

[8] **Scope**

[9] This standard provides guidance for the evaluation of pest risks associated with growing media accompanying plants for planting and describes phytosanitary measures to facilitate pest risk management of such growing media used in the international movement of plants for planting.

[10] Bulk growing media and growing media as contamination of a commodity are not considered in this standard. Animal and human health risks associated with growing media are also not considered.

[11] **Impact on Biodiversity and the Environment**

[12] Regulated pests associated with the movement of growing media accompanying plants for planting in international trade may have negative impacts on biodiversity. Implementation of this standard could significantly reduce the introduction and spread of pests associated with growing media and consequently reduce their negative impacts. In addition, the application of phytosanitary measures in accordance with this standard could also reduce the probability of introduction and spread of other organisms that may become invasive alien species in the country of import and thus affect biodiversity.

[13] Certain pest risk management measures (e.g. some treatments with fumigants) may have a negative impact on the environment. Countries are encouraged to promote the use of phytosanitary measures that have a minimal negative impact on the environment.

[14] **References**

[15] **ISPM 2.** 2007. *Framework for pest risk analysis*. Rome, IPPC, FAO.

[16] **ISPM 5.** *Glossary of phytosanitary terms*. Rome, IPPC, FAO.

[17] **ISPM 11.** 2004. *Pest risk analysis for quarantine pests including analysis of environmental risks and living modified organisms*. Rome, IPPC, FAO.

[18] **ISPM 20.** 2004. *Guidelines for a phytosanitary import regulatory system*. Rome, IPPC, FAO.

[19] **ISPM 31.** 2008. *Methodologies for sampling of consignments*. Rome, IPPC, FAO.

[20] **ISPM 34.** 2010. *Design and operation of post-entry quarantine stations for plants*. Rome, IPPC, FAO.

[21] **ISPM 36.** 2012. *Integrated measures for plants for planting*. Rome, IPPC, FAO.

[22] **Definitions**

[23] Definitions of phytosanitary terms can be found in ISPM 5 (*Glossary of phytosanitary terms*, revised annually).

[24] In addition to the definitions in ISPM 5, in this standard the following definition applies:

[25] Soil: A growing medium that is naturally occurring, composed of the loose surface material of the earth and consisting of a mixture of minerals and organic material.

[26] **Outline of Requirements**

[27] Pest risk analysis (PRA), which is carried out by the national plant protection organization (NPPO) of the importing country, should provide the technical justification for phytosanitary import requirements for regulated pests associated with the international movement of growing media accompanying plants for planting.

[28] The origin and the production methods of constituents of growing media, which can be used alone or in combination, affect the pest risks that are associated with the growing media used with plants for planting. Growing media should be produced, stored and maintained under conditions to prevent contamination. Growing media should be treated by an approved method before use if previously exposed to plants or soil.

[29] Production methods of plants for planting may alter the pest risks of growing media used with these plants for planting.

[30] Various pest risk management options related to growing media in association with plants for planting – including phytosanitary measures such as treatment, inspection, sampling, testing, integrated measures in a systems approach, post-entry quarantine and prohibition – are described in this standard.

[31] **Background**

[32] Growing medium is defined by the IPPC as “any material in which plant roots are growing or intended for that purpose” (ISPM 5). Many countries have legislation in place to regulate the movement of growing media, particularly soil or soil as a component of growing media.

[33] A number of growing media are recognized internationally as high-risk pathways for the introduction and spread of quarantine pests. Soil as a growing medium is considered to be a high-risk pathway because it can harbour numerous pests of phytosanitary concern to many countries. The pest risks of growing media accompanying plants for planting depend on a number of factors associated with both the production of the growing media and the production of the plants, as well as the interaction of the two. Important pest risk factors include the presence of or exposure to soil during propagation and production, the length of the plant’s production cycle, and for growing media containing soil, the separation between the country of origin and the country of import.

[34] Many countries therefore regulate the movement of growing media in association with plants for planting. Growing media are often prohibited, particularly soil or soil as a constituent of growing media. While some plants for planting can have associated growing media washed off or shaken off, it is often difficult to completely avoid the movement of growing media with plants for planting. Some plants can survive transport only when moved in growing media. There is a need for internationally harmonized phytosanitary measures to minimize the probability of introduction or spread of pests with the movement of growing media accompanying plants for planting in international trade.

[35] **Requirements**

[36] **1. Pest Risk Analysis**

[37] For the evaluation of pest risks of growing media accompanying plants for planting, the NPPO of the importing country should carry out PRA in accordance with ISPM 2:2007 and ISPM 11:2004, including the consideration of pest risk factors of various growing media described in this standard. It should be noted that pests carried with growing medium accompanying a plant may be pests of other plants.

[38] **2. Constituents of Growing Media and their Associated Pest Risk**

[39] The origin and the production methods of constituents (used alone or in combination) of growing media affect the pest risks that are associated with the growing media accompanying plants for planting. Annex 1a lists constituents of growing media and indicates their pest risk under the assumption that they were not previously used as growing media or packing material and have been handled and stored in a way that minimizes contamination. Annex 1b provides specific guidance on growing media associated with plants for planting that may generally be considered of low or negligible risk.

[40] Growing media containing organic constituents may be more likely to harbour pests than purely mineral or synthetic growing media. Growing media consisting of plant debris generally pose a greater pest risk, even after heat or chemical treatment, than mineral or synthetic growing media. If soil is part of the growing medium or the probability that the medium will be contaminated with soil is considered high, the pest risk may be particularly difficult to fully assess due to the likely presence of many different pests and other organisms not yet deemed to be pests. The PRA should focus on the growing media constituent(s) posing the highest pest risk.

### [41] **3. Production of Growing Media and Treatment Before Use**

[42] The pest risks posed by growing media depend largely on the media's production methods and the degree of processing.

[43] Growing media should be produced under a management system that allows appropriate traceability (back and forward). Growing media should be produced, stored and maintained under conditions that prevent their contamination. The media should not be exposed to any plants or soil (in the case of soil-free growing media). If this has not been achieved, depending on the result of the PRA, the growing media may need to be treated by an appropriate method before use, such as steam pasteurization, heat treatment, chemical treatment, fumigation or sterilization.

### [44] **4. Factors that Affect the Pest Risks of Growing Media Used for Plants for Planting**

[45] The production methods of plants for planting may affect the pest risks of the growing media used. While some growing media may pose a low pest risk by nature of their production, they may become contaminated during the production process of plants for planting. Requirements contained in ISPM 36:2012 on integrated measures for plants for planting should be considered to prevent contamination of the growing media. Production should be initiated from growing media, plants for planting and water that are all pest free. Additional phytosanitary measures may be used, either alone or in combination, to ensure the pest risks are managed.

[46] The NPPO of the importing country may take into consideration the pest risks (as outlined in Annex 1a and 1b and Appendix 1) of constituents of growing media in association with plants for planting when conducting a PRA to identify appropriate phytosanitary measures. Furthermore, pest risks may depend on:

[47] • degree of geographical similarity of, or distance between, country of origin and country of import (e.g. pest risk related to soil originating in different continents versus adjacent countries within one ecoclimatic region)

[48] • status of relevant pests in the exporting or importing country (e.g. pest free area, area of low pest prevalence)

[49] • production systems in place to prevent contamination of growing media, and traceability of the growing media during production and storage

[50] • intended location and use of the plants for planting associated with the growing media

[51] • history of trade, if it exists (e.g. new trade versus long trade history of plants with soil)

- [52]       • notifications of non-compliance of imported consignments, if they exist.

## [53]       **5. Pest Risk Management Options**

### [54]       **5.1 Treatments to prevent or limit the movement of pests with growing media**

[55]       Treatments can be applied at various points in the production cycle of plants for planting to mitigate the risks associated with pests in the growing media. These treatments can be applied alone or in combination:

- [56]       • treatment of growing media before planting (see section 3)
- [57]       • treatment of plants before planting
- [58]       • treatment of fields or planting beds intended for the production of plants for planting
- [59]       • treatment of growing media in association with plants for planting
- [60]       • removal of growing media by root washing or plant shaking.

[61]       It may be important to verify the effectiveness of a treatment after application. Factors such as temperature may affect the efficacy of certain pesticides.

[62]       Removal of the original growing media by root washing or plant shaking may be accompanied by a requirement for the plants to be replanted in fresh, pest free growing media shortly before export.

[63]       After treatment, appropriate measures should be taken to avoid recontamination.

### [64]       **5.2 Inspection, sampling and testing**

[65]       Growing media associated with plants for planting may be inspected in the country of origin or at the point of entry to the importing country to determine if pests are present or to determine compliance with phytosanitary requirements. However, inspection is not a reliable method for detecting most pests in soil.

[66]       Therefore, the NPPO of the importing country may require sampling and testing of the growing media accompanying plants for planting (cf. ISPM 20:2004 and ISPM 31:2008). This may include testing for indicator organisms. However, even sampling and testing may not be a fully reliable detection method for many pests, and in particular, for detecting low-level contamination of growing media.

### [67]       **5.3 Post-entry quarantine**

[68]       The NPPO of the importing country may require post-entry quarantine (PEQ) to verify compliance or to apply phytosanitary measures before the release of the consignment. ISPM 34:2010 provides guidance for the design and operation of PEQ stations.

[69]       In cases where knowledge about the pest risks is incomplete or there is an indication of a failure of measures taken in the exporting country (e.g. from a significant number of interceptions), PEQ may be an option for monitoring or regaining trust in the reliability of measures taken in the exporting country.

### [70]       **5.4 Prohibition**

[71] In cases where for some growing media (in particular soil), in combination with certain plants for planting, the measures outlined in this standard are not applicable or feasible, or they cannot provide sufficient protection, the entry of the consignment of plants for planting containing those particular growing media may be prohibited.

[72] This annex was adopted by the Commission on Phytosanitary Measures in [Month 201-].

[73] The annex is a prescriptive part of the standard.

[74] **ANNEX 1a: Pest risks of various constituents of growing media**

[75]

Constituents of growing media	Pest risk <sup>1</sup>	Support pest survival	Comments
Baked clay pellets	Low	No	Inert
Pure clay	Low	No	n/a
Gravel, sand, silt	Low	No	Inert
Synthetic media (e.g. glass wool, rock wool, polystyrene, floral foam, plastic particles, polyethylene, polymer stabilized starch, polyurethane, water absorbing polymers)	Low	No	Inert (but root knot and cyst nematodes can survive in rock wool)
Vermiculite, perlite, volcanic rock, zeolite, scoria	Low	No	Inert
Coconut fibres (coir/coco peat)	Variable low	Yes	Risk depends on level of processing (e.g. red ring nematode has been found in the husks of fallen nuts)
Paper	Low	Yes	High level of processing
Sawdust, wood shavings (excelsior)	Low–Medium	Yes	Size of particles and level of processing reduces the probability of pest survival after processing
Tissue culture medium (agar-like)	Low	Yes	Autoclaved or otherwise sterilized before use
Water	Low	Yes	Risk depends on source or treatment
Wood chips	Medium	Yes	Risk depends on particle size and level of processing

Cork	Variable low	Yes	Risk depends on level of processing
Peat	Variable low	Yes	Peat is a natural habitat for nematodes, mostly bacterial and fungal eaters; risk is lower where the origin has had no agricultural exposure (e.g. certified bogs)
Sphagnum moss	Variable high	Yes	Risk depends on level of processing
Other plant material (e.g. rice hulls/chaff, grain hulls, coffee hulls, sugarcane refuse, grape marc, cocoa pods)	Variable high	Yes	Risk is reduced if treated or from a clean non-infested source
Bark	High	Yes	Risk depends on source (potential to harbour forest pests) and degree of processing or fermentation
Bio waste	High	Yes	Unprocessed waste from plant or animal sources related to human activities
Compost	High	Yes	Risk reduced if produced by an approved process; risk increased if material is from an unknown source
Humus	High	Yes	Decomposed plant matter
Soil	High	Yes	Risk can be reduced if treated
Tree fern slabs	High	Yes	Potential to harbour forest pests
Vermicompost (vermicast plus earthworms)	High	Yes	Some non-native earthworms may be vectors of pests

[76] Footnote 1 For growing media not previously used for planting and which have been handled and stored in a way that prevents contamination.

[77] **ANNEX 1b: Growing media associated with plants that may be considered low pest risk**

[78] **Note: These tables describe only the pest risk associated with the growing medium, not with the plants.**

[79] **Table 1: Combinations of growing medium and other measures that result in negligible pest risk**

[80]

Growing medium	Water/nutrients	Other measures	Examples
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Water	Water or water-based nutrient solution	Sterilized, treated or filtered water may be required	Plants rooted in water
Tissue culture medium	N/A (incorporated in sterile medium)	Maintained in aseptic conditions	Tissue cultured plants transported in closed containers
Inert material that is not capable of supporting pest growth (e.g. perlite)	Sterilized water-based nutrient solution	Maintained in conditions to prevent pest colonization	Plants for hydroponic cultivation where the absence of pests can be verified
Growing medium that has been sterilized (e.g. by heat to a specified temperature for a specified duration)	Pest free (sterilized, treated or filtered) water supply	Maintained in conditions to prevent pest colonization	Plants grown from seed in modules under protected conditions

[81] **Table 2: Combinations of growing medium and other measures that may result in low risk for a specific pest**

[82]

Growing medium	Water/nutrients	Other measures	Examples
Treated growing medium (e.g. fumigated or drenched with an appropriate chemical treatment)	Clean water supply or if pest is likely to be transmitted in water, appropriately sterilized, treated or filtered water supply	Prevention of colonization by the relevant pest (e.g. pest free area, pest free place of production, protected conditions, prevention of transmission by wind, grown on benches separated from contact with soil)	Plants in pots in growing medium treated with an insecticide to kill a specific insect pest and grown in protected conditions

[83] This appendix was adopted by the Commission on Phytosanitary Measures in [Month 201-].

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

[85] **APPENDIX 1: Types of plants for planting in international trade and their commonly used growing media**

[86]

Plant type	Growing media	Comments
Unrooted cuttings	None	
Plants rooted in water or water-based nutrient solutions	Water	Some plants may be grown from cuttings in water or in water-based nutrient solutions, with or without synthetic growing media.
Tissue cultured plants	Sterile, agar-like	Tissue cultured plants are produced in association with sterile agar-like growing media. They may be shipped in sealed aseptic containers or ex-agar.
Epiphytic plants	Tree fern slabs, bark, wood, sphagnum moss, volcanic cinder, rock	Epiphytic plants, such as bromeliads and orchids, are often shipped in association with tree fern slabs, bark, wood, sphagnum moss, volcanic cinder, rock and so forth. These materials are generally intended for support and ornamentation rather than being true growing media.
Rooted herbaceous cuttings	Various (including peat, coco peat, synthetic media, sphagnum moss)	Rooted herbaceous cuttings are generally rooted and moved in soil-free growing media that may be contained in peat-pots or coco-pots. The roots are tender and the growing media cannot be removed without injuring the plants. The growing cycle for these plants is generally very short.
Plants grown from seed	Various (including peat, vermiculite, perlite)	Annuals and biennials are generally grown from seed in growing media and moved as rooted in growing media.
Potted greenhouse plants	Various (including synthetic media, vermiculite, perlite, peat, coco peat)	Potted greenhouse plants are generally grown exclusively in greenhouses under controlled conditions and in soil-free growing media.
Ornamental and flowering houseplants	Various (including synthetic media, vermiculite, perlite, coco peat)	The plants may be field grown in soil, grown as containerized nursery stock, or grown as potted greenhouse plants in soil-free growing media.
Liners, whips	Various (including peat, vermiculite) or soil as a contaminant	These young plants are generally rooted in soil or in soil-free growing media in containers or trays.
Dormant bulbs and tubers	Soil, peat	Bulbs, tubers (including corms and rhizomes), tubercles

tuberous roots and herbaceous perennial roots	( <i>Lilium</i> ) or none ( <i>Tulipa</i> )	roots and herbaceous perennial roots are generally propagated and grown in fields but shipped dormant and free from growing media. Certain bulbs, such as lilies, are very difficult to ship completely free from soil.
Bare root nursery stock	Soil, none	Bare root is a technique of arboriculture whereby a field grown tree or shrub is dug up in order to put it into a dormant state. The nursery stock may be shaken to remove some of the soil, or it may be washed free from all soil and growing media. The size and root structure of the plant and the type of soil has a large impact on the ability to remove soil from the root system.
Artificially dwarfed nursery stock	Soil	The plant roots are typically very difficult to wash free from soil. The plants may be transplanted to soil-free growing media and grown in greenhouses using integrated risk mitigation measures in an effort to minimize the pest risks associated with them.
Trees and shrubs with soil	Soil	Older trees and shrubs, including specimen trees, are often moved in the nursery trade as dug trees or "ball and burlap". This material includes a large volume of soil.
Turf or grass sod	Soil	Turf or grass sod contains a large volume of soil and is a potential pathway for many soil pests.

[87] This appendix was adopted by the Commission on Phytosanitary Measures in [Month 201-].

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

[89] **APPENDIX 2:** Indicative list of pests that may be of concern with respect to the movement of growing media accompanying plants for planting

[90]

<b>Bacteria and phytoplasmas</b>
<ul style="list-style-type: none"> <li>• <i>Agrobacterium</i></li> </ul>
<ul style="list-style-type: none"> <li>• <i>Ralstonia</i></li> </ul>
<ul style="list-style-type: none"> <li>• <i>Streptomyces</i></li> </ul>
<b>Fungi</b>
<ul style="list-style-type: none"> <li>• <i>Tilletia</i></li> </ul>
<b><i>Phytophthora</i> and other oomycetes</b>

<ul style="list-style-type: none"><li>• <i>Synchytrium</i></li></ul>
<b>Nematodes</b>
<ul style="list-style-type: none"><li>• <i>Bursaphelenchus</i></li></ul>
<ul style="list-style-type: none"><li>• Cyst nematodes, root knot nematodes</li></ul>
<b>Viruses and virus-like organisms transmitted via nematode vectors</b>
<b>Insects and mites</b>
<ul style="list-style-type: none"><li>• <i>Anastrepha</i></li></ul>
<ul style="list-style-type: none"><li>• <i>Diabrotica</i></li></ul>
<ul style="list-style-type: none"><li>• <i>Rhagoletis</i></li></ul>
<ul style="list-style-type: none"><li>• Agromyzidae</li></ul>
<ul style="list-style-type: none"><li>• Other fruit flies</li></ul>
<ul style="list-style-type: none"><li>• Thrips (below ground part of life cycle)</li></ul>
<ul style="list-style-type: none"><li>• Bark beetles</li></ul>
<b>Molluscs</b>
<b>Plants (beyond the intended plant)</b>
<ul style="list-style-type: none"><li>• Seeds and other propagules</li></ul>