[1]**DRAFT ISPM: International movement of cut flowers (2008-005)**

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| [2]**Status box** | |
| [3]This is not an official part of the ISPM and it will be modified by the IPPC Secretariat after adoption. | |
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| [29]**Notes** | [30]2014-07 Edited  [31]2017-02 Edited  [32]2017-05 Edited  [33]**Please note that some paragraph numbers may be missing from the document or not be in a chronological order. This is due to technical problems in the OCS but it does not affect the integrity of the content of the document.** |

[34]

[35]CONTENTS [to be inserted later]

[36]Adoption

[37]This standard was adopted by the XX Session of the Commission on Phytosanitary Measures in XXXX.

[38]Introduction

[39]Scope

[40]This standard provides guidance on identification of the pest risk associated with cut flowers and non-woody foliage, for decoration or ornamentation (hereafter referred to as cut flowers), and on phytosanitary measures to reduce the likelihood of pests being moved with this commodity in international trade. The standard covers flowers with their stems or foliage.

[41]The standard does not cover dried or otherwise preserved plant parts, plants for planting, or processed plant material and articles manufactured from plants or plant products.

[42]References

[43]The present standard refers to ISPMs. ISPMs are available on the International Phytosanitary Portal (IPP) at <https://www.ippc.int/core-activities/standards-setting/ispms>.

[44]Definitions

[45]Definitions of phytosanitary terms used in the present standard can be found in ISPM 5 (*Glossary of phytosanitary terms*).

[46]Outline of Requirements

[47]This standard identifies specific factors relating to the international movement of cut flowers (e.g. high perishability, cold storage) that should be taken into account when conducting pest risk analysis.

[48]The standard provides examples of pest groups that may be associated with the international movement of cut flowers.

[49]It also provides guidance on options to be considered as part of the pest risk management for cut flowers, taking into account that several ISPMs provide general guidance on pest risk management (e.g. ISPM 2(*Framework for pest risk analysis*), ISPM 11(*Pest risk analysis for quarantine pests*)).

[50]BACKGROUND

[51]Cut flowers are a short-lived commodity that may be a pathway for pest entry, although this may not always lead to establishment. Phytosanitary measures such as inspection, certification and treatments often involve a variety of phytosanitary actions to reduce the associated pest risk. Guidelines on how to minimize the pest risk from quarantine pests present in cut flowers prior to import may facilitate international trade in this commodity class.

[52]International movement of cut flowers may involve pest risk that is associated with particular pest groups and certain genera. Accurate pest diagnosis is crucial for the appropriate application of phytosanitary measures. Import of cut flowers, which are perishable, may be delayed if pests are detected and a treatment is required at the point of entry. Guidelines on how to minimize the pest risk from quarantine pests present in cut flowers prior to import could also help to reduce delays at points of entry.

[53]Impact on Biodiversity and the Environment

[54]The implementation of this ISPM could reduce the likelihood of introduction of quarantine pests, thereby contributing to the protection of biodiversity and the environment. Certain treatments may have negative impacts on the environment and national plant protection organizations (NPPOs) are encouraged to promote the use of phytosanitary measures that are environmentally acceptable.

[55]Requirements

[56]1. Pest Risk Analysis

[57]Pest risk analysis (PRA) should be conducted in accordance with ISPM 2 and ISPM 11. When performing a PRA, the short-lived characteristics and the intended use (for decoration or ornamentation) of cut flowers should be considered, because they may affect the likelihood of pest establishment.

[58]1.1 Specific factors to consider when conducting a PRA for cut flowers

[59]In addition to the general considerations given in ISPM 11, the following specific factors associated with cut flowers should be considered when conducting the PRA:

* [60]the ease of pest detection, which may differ depending on the genus and species of cut flower (e.g. the number of petals, whether it has closed flowers or not)
* [61]if more than one plant genus or species is present in the commodity (e.g. bouquets), they should all be considered separately
* [62]the production system (e.g. greenhouse, field or wild)
* [63]the biology of the associated pest, specifically the ability of the pest to complete its life cycle on the cut flowers
* [64]the perishability, shelf-life, transport, cold storage and intended use of the cut flowers in relation to survival and establishment of the pest
* [65]harvest and post-harvest practices (e.g. quality checks, cleaning, handling, processing and treatments), which may remove or exclude certain pests
* [66]the presence of fruit or other propagules.

[67]1.2 Risk ranking of major pest groups for cut flowers

[68]The relative risk ranking of pest groups associated with cut flowers may assist NPPOs in focusing on pests that can enter and establish.

[69]Pest risk varies within the broad category of cut flowers, depending on the plant taxon and the species of pest. Furthermore, within any given cut flower species there is a range of pest risk associated with the type of material being moved (e.g. bare stemmed, stems with foliage, fruit). Some examples of higher- and lower-risk pest groups are indicated below. This relative ranking may be useful as guidance in the PRA. The ranking may vary depending on the specific circumstances. In general, for insects, adults on cut flowers pose a higher risk than other life stages. Due to the cold storage and transport and the short shelf-life of cut flowers, juvenile life stages are less likely to develop to adults and therefore pose a lower risk.

[70]Examples of pest groups that may be associated with different genera of cut flowers are listed in Table 1.

[71]1.2.1 Examples of higher-risk pest groups (in alphabetical order)

[72]***Aphids (Aphididae).*** Aphids can be polyphagous, and females can reproduce parthenogenetically. Many aphid species can produce winged forms that can migrate long distances to new host plants. Because many aphids often need not mate or find places to oviposit during the growing season, they probably can establish more easily than many other insects. Some aphids are vectors for plant viruses.

[73]***Leafminers (e.g. Agromyzidae).*** Compared to many other pest groups, a greater proportion of leafminers on cut flowers in trade tend to be adults. Consequently, they often may not need to complete development on this short-lived commodity, and as adults may have greater mobility and ability to transfer from the commodity to a host. The most significant leafminers tend to be polyphagous and therefore have a greater likelihood of finding a suitable host.

[74]***Thrips (Thripidae).*** Thrips oviposit in leaf tissue, and adults and nymphs feed on the flowers and leaves of many plants. Thrips can fly, may exhibit host shifts in new areas and can reproduce parthenogenetically. Many thrips are also vectors of other pests.

[75]1.2.2 Examples of lower- or negligible-risk pest groups (in alphabetical order)

[76]***Moths (e.g. Noctuidae, Geometridae, Tortricidae).*** Mobile adults rarely occur in the cut flower pathway. Immature stages of these pests may be much more common, but these are relatively immobile and unlikely to complete their development within the short vase-life of cut flowers. Many species require pupation in soil. For these reasons, moths seem highly unlikely to escape the pathway in large enough numbers to emerge as adults, successfully find mates and establish.

[77]***Nematodes (Nematoda).*** Most nematodes are associated with below-ground parts of plants, and therefore only rarely would be present on cut flowers. Only nematodes feeding on the leaves (e.g. *Aphelenchoides* spp.) are expected to be associated with cut flowers.

[78]***Pathogens.*** In the case of most pathogens, infected cut flowers are likely to be asymptomatic. However, because few of the genera associated with cut flowers can propagate easily, systemic plant pests (for example, viruses) may only rarely escape the pathway.

[79]***Whiteflies (Hemiptera).*** These are sap sucking insects found in groups on the underside of leaves. Nymphs normally occur in clusters and suck from the leaves. Whiteflies are vectors for viral diseases.

[80]1.3 Pest groups

[81]Examples of pest groups that may be associated with the cut flowers and other fresh parts of various plant genera are listed in Table 1. The list presented is neither exhaustive nor comprehensive. Other pest groups may need to be considered in some circumstances.

[82]1.4 Other factors that increase pest risk for cut flowers

[83]It is important to mention that there are some other factors that should be considered when conducting a PRA for the international movement of cut flowers. Fruit and other propagules associated with cut flowers may present a higher pest risk. The presence or absence of propagules should, therefore, be considered when conducting a PRA for the establishment of phytosanitary import requirements of cut flowers.

[84]The production system for the cut flowers (e.g. wild, field or greenhouse grown) may also affect the pest risk that they pose. Different pests and higher incidences of pests can be expected on plants collected in the wild than on cut flowers cultivated under controlled conditions. Moreover, not all available management measures can be applied to naturally occurring plants. When conducting a PRA, special attention therefore needs to be paid to identifying the pest risk that is particularly associated with cut flowers obtained from plants grown in the wild.

[85]Cut flowers are a perishable commodity and temperature is the most important factor that influences their shelf-life. Therefore, if possible, most cut flowers are transported and stored in a cold condition from the time the cut flowers are collected to the time they are sold at the consumer level. This will also affect the further development, the survival and the mobility of pests present on these commodities.

[86]2. Phytosanitary Measures

[87]A number of different phytosanitary measures may be applied based on the outcome of the PRA. Appropriate measures should be chosen based on their effectiveness in reducing the probability of introduction of the pest. Selected phytosanitary measures should be appropriate to the pest risk and technically justified. For existing trade, new measures should only be applied after the PRA has been completed (or revised). Required measures may include:

* [88]surveillance for pest freedom
* [89]the application of a pre-dispatch treatment
* [90]inspection of the consignment
* [91]treatment on arrival at the point of entry.

[92]2.1 Options to be considered as part of pest risk management

[93]Pest risk management options may include regulations on production, harvest, transport, storage, locations of import and use, sale, waste disposal, time of year import takes place, and requirements regarding processing or treatments (e.g. devitalization). In identifying options to be considered as part of pest risk management, the feasibility of control measures, applicability depending on the production system (e.g. wild, field or greenhouse grown) the cut flowers, ease of detection, identification of the pests, time needed for effective control, and difficulty of eradication or containment should be considered. In identifying pre-harvest, harvest and post-harvest options for pest risk management, reference is made to ISPM 14 (*The use of integrated measures in a systems approach for pest risk management*).

[94]Pest free areas (ISPM 4 (*Requirements for the establishment of pest free areas*); ISPM 8 (*Determination of pest status in an area*); ISPM 29 (*Recognition of pest free areas and areas of low pest prevalence*)) and pest free places of production (ISPM 10 (*Requirements for the establishment of pest free places of production and pest free production sites*)) may be established to manage the pest risk associated with cut flowers. The following summarizes many of the options commonly used and that are based on a PRA.

[95]2.1.1 Production and pre-harvest options

* [96]treatment of growing media (e.g. sterilization, chemical treatment, fumigation)
* [97]field pest monitoring and detection
* [98]field treatments including biocontrol activities
* [99]chemical control (e.g. fumigants, aerosols, mists, fogs, dusts, dips, granules, sprays)
* [100]physical control (e.g. bagging).

[101]2.1.2 Harvest and post-harvest options

* [102]grading or sorting (to separate clean from infested material both at harvesting and at packing house)
* [103]inspection for presence of quarantine pests or symptoms (e.g. at timed intervals)
* [104]chemical control (e.g. spraying, dipping, fogging, fumigation)
* [105]physical control (e.g. shaking, cleaning, washing, brushing, waxing)
* [106]packaging (e.g. new, clean, secure)
* [107]harvesting at certain times of the year or growing season (limiting harvest to a specific season or plant age).

[108]2.1.3 Options for pre-dispatch treatment

* [109]fumigation
* [110]irradiation (can be used against particular pests of cut flowers, although some damage may occur)
* [111]application of a controlled atmosphere
* [112]cold, heat or vapour treatment
* [113]devitalization.

[114]2.1.4 Transportation options

* [115]treatment (e.g. application of a controlled atmosphere or environmental conditions; cold treatment for arthropods)
* [116]examination and cleaning of conveyances, as necessary, prior to loading.

[117]2.1.5 Options on arrival

* [118]documentation checks
* [119]phytosanitary inspection
* [120]testing
* [121]treatment.

[122]Each lot in a consignment should be identified in a way that can be traced back to the place of production. In the case of treatments applied, measures should be adopted to segregate treated and non-treated lots and to protect treated lots from contamination or infestation.

[123]Further guidance on measures for consignments to be imported is provided in ISPM 20 (*Guidelines for a phytosanitary import regulatory system*).

[124]3. Records

[125]A place of production should maintain records on its premises as specified by the NPPO of the exporting country. The documentation and records should be reviewed and updated regularly. For traceability and auditing purposes, these records should be maintained for at least 12 months and made available to the NPPO of the importing country upon request.

[126]**Table 1.** Examples of pest groups that may be associated with the international movement of cut flowers and other fresh plant parts.

| [127]**Examples of cut flowers and other fresh parts by scientific name (common name or names), family name** | [128]**Organisms that affect the cut flowers and other fresh parts** | | |
| --- | --- | --- | --- |
| [130]**Phylum** | [131]**Order** | [132]**Common names** |
| [133]*Alpinia* spp. (ginger-lilies), Zingiberaceae | [134]Arthropods (insects) | [135]Hemiptera | [136]Whiteflies, mealybugs, scales |
| [137]*Asparagus* spp. (asparagus), Asparagaceae | [138]Basidiomycota | [139]Pucciniales | [140]Rusts (e.g. rose rust, chrysanthemum white rust, carnation rust) |
| [141]*Aster* spp. (asters, Michaelmas daisy), Asteraceae | [142]Arthropods (insects) | [143]Diptera, Lepidoptera, Hymenoptera | [144]Leafminers |
| [147]Hemiptera | [148]Aphids |
| [151]Hemiptera | [152]Bugs (e.g. Miridae) |
| [155]Hemiptera | [156]Whiteflies, mealybugs, scales |
| [159]Lepidoptera | [160]Moths (e.g. Noctuidae) |
| [163]Thysanoptera | [164]Thrips |
| [166]Oomycota | [167]Peronosporales  [168]Pythiales | [169]*Phytopthora* spp., *Pythium* spp. |
| [170]*Brunia* spp. (coffee bush, brunia), Bruniaceae | [171]Arthropods (insects) | [172]Diptera: Cecidomyiidae | |
| [173]*Chrysanthemum* spp. (mum), Asteraceae | [174]Arthropods (insects) | [175]Coleoptera | [176]Beetles |
| [179]Diptera | [180]Leafminers |
| [183]Hemiptera | [184]Aphids |
| [187]Hemiptera | [188]Whiteflies, mealybugs, scales |
| [191]Lepidoptera | [192]Moths (e.g. Noctuidae) |
| [195]Thysanoptera | [196]Thrips |
| [198]Proteobacteria | [199]Enterobacteriales | [200]*Erwinia* spp. |
| [202]Basidiomycota | [203]Pucciniales | [204]Rusts (e.g. rose rust, chrysanthemum white rust, carnation rust) |
| [206]Viruses, viroids and other bacterial diseases | | |
| [207]*Codiaeum variegatum* (croton leaves), Euphorbiaceae | [208]Molluscs | [209]Pulmonata | [210]Snails and slugs |
| [211]*Cymbidium* spp. (boat orchid), Orchidaceae | [212]Arthropods (insects) | [213]Thysanoptera | [214]Thrips |
| [215]*Cyperus* spp. (papyrus), Cyperaceae | [216]Molluscs | [217]Pulmonata | [218]Snails and slugs |
| [219]*Dendrobium* spp. (epiphytic orchids), Orchidaceae | [220]Ascomycota | [221]Helotiales (*Botrytis*) | [222]Botrytis (grey mould) |
| [224]Arthropods (insects) | [225]Diptera | [226]Gall midges |
| [229]Thysanoptera | [230]Thrips |
| [232]Arthropods (mites) | [233](e.g. spider mites from family Tetranychidae) | |
| [234]*Dianthus* spp. (carnations), Caryophyllaceae | [235]Arthropods (insects) | [236]Coleoptera | [237]Beetles |
| [240]Diptera | [241]Leafminers |
| [244]Hemiptera | [245]Aphids |
| [248]Hemiptera | [249]Whiteflies, mealybugs, scales |
| [252]Lepidoptera | [253]Moths (e.g. Noctuidae) |
| [256]Thysanoptera | [257]Thrips |
| [259]Arthropods (mites) | [260](e.g. spider mites from family Tetranychidae) | |
| [262]Ascomycota | [263]Pleosporales (Alternaria)  [264]Hypocreales (Fusarium) | [265]Carnation blight  [266]Fusarium wilt |
| [268]Oomycota | [269]Peronosporales  [270]Pythiales | [271]*Phytopthora* spp., *Pythium* spp. |
| [273]Viruses, viroids and other bacterial diseases | | |
| [274]*Dracaena* spp. (Madagascar dragon tree, dracaena), Liliaceae | [275]Molluscs | [276]Pulmonata | [277]Snails and slugs |
| [278]*Eryngium* spp. (sea holly, spiny coriander), Apiaceae | [279]Arthropods (insects) | [280]Diptera | [281]Leafminers |
| [284]Hemiptera | [285]Whiteflies, mealybugs, scales |
| [286]*Eustoma* spp. (lisianthus), Gentianaceae | [287]Arthropods (insects) | [288]Diptera | [289]Leafminers |
| [292]Hemiptera | [293]Whiteflies, mealybugs, scales |
| [294]*Freesia* spp. (freesia), Iridaceae | [295]Arthropods (insects) | [296]Coleoptera | [297]Beetles |
| [300]Hemiptera | [301]Aphids |
| [304]Hemiptera | [305]Whiteflies, mealybugs, scales |
| [308]Thysanoptera | [309]Thrips |
| [310]*Geranium* spp. (geranium), Geraniaceae | [311]Ascomycota | [312]Helotiales (*Botrytis*) | [313]Botrytis (grey mould) |
| [314]*Gerbera* spp. (gerbera), Asteraceae | [315]Arthropods (insects) | [316]Coleoptera | [317]Beetles |
| [320]Hemiptera | [321]Whiteflies, mealybugs, scales |
| [324]Thysanoptera | [325]Thrips |
| [327]Arthropods (mites) | [328](e.g. spider mites from family Tetranychidae) | |
| [330]Oomycota | [331]Peronosporales  [332]Pythiales | [333]*Phytopthora* spp., *Pythium* spp. |
| [334]*Gladiolus* spp. (gladiolus), Iridaceae | [335]Arthropods (insects) | [336]Coleoptera | [337]Beetles |
| [339]Ascomycota | [340]Helotiales (*Botrytis*)  [341]Hypocreales (*Fusarium*) | [342]Fusarium rot and yellows  [343]Leaf spots and blights |
| [345]Arthropods (insects) | [346]Hemiptera | [347]Aphids |
| [350]Hemiptera | [351]Whiteflies, mealybugs, scales |
| [354]Thysanoptera | [355]Thrips |
| [356]*Gypsophila* spp. (common gypsophila, baby's breath), Caryophyllaceae | [357]Arthropods (insects) | [358]Diptera | [359]Leafminers |
| [362]Hemiptera | [363]Whiteflies, mealybugs, scales |
| [366]Thysanoptera | [367]Thrips |
| [368]*Helianthus* spp. (sunflower), Asteraceae | [369]Arthropods (insects) | [370]Hemiptera | [371]Aphids |
| [374]Hemiptera | [375]Bugs (e.g. Miridae) |
| [378]Hemiptera | [379]Whiteflies, mealybugs, scales |
| [382]Thysanoptera | [383]Thrips |
| [384]*Hydrangea* spp. (hidrangea or hortencia), Hydrangeaceae | [385]Arthropods (insects) | [386]Hemiptera | [387]Aphids |
| [390]Hemiptera | [391]Whiteflies, mealybugs, scales |
| [393]Arthropods (mites) | [394](e.g. spider mites from family Tetranychidae) | |
| [395]*Hypericum* spp. (hypericum), Hypericaceae | [396]Arthropods (insects) | [397]Hemiptera | [398]Whiteflies, mealybugs, scales |
| [401]Thysanoptera | [402]Thrips |
| [404]Ascomycota | [405]Capnodiales (*Passalora hyperici*)  [406]Xylariales (*Diploceras hypericinum*) | [407]Leaf spotting and leaf blight |
| [409]Arthropods (mites) | [410](e.g. spider mites from family Tetranychidae) | |
| [411]*Lilium* spp. (Lily), Liliaceae | [412]Arthropods (insects) | [413]Coleoptera | [414]Beetles |
| [417]Thysanoptera | [418]Thrips |
| [420]Ascomycota | [421]Plectosphaerellaceae (*Verticillium*)  [422]Hypocreales (*Fusarium*) | [423]Verticillium wilt  [424]Fusarium bulb rot |
| [426]Oomycota | [427]Peronosporales  [428]Pythiales | [429]*Phytopthora* spp. and *Pythium* spp. |
| [430]*Limonium* spp. (statice), Plumbaginaceae | [431]Arthropods (insects) | [432]Thysanoptera | [433]Thrips |
| [434]*Molucella* spp. (bells of Ireland), Lamiaceae | [435]Arthropods (insects) | [436]Diptera | [437]Leafminers |
| [440]Hemiptera | [441]Aphids |
| [444]Hemiptera | [445]Whiteflies, mealybugs, scales |
| [446]*Phalaenopsis* spp.(moth orchid), Orchidaceae | [447]Arthropods (insects) | [448]Coleoptera | [449]Beetles |
| [450]*Polyanthes* spp. (polyanthes), Asparagaceae | [451]Arthropods (insects) | [452]Coleoptera | [453]Beetles |
| [456]Hemiptera | [457]Aphids |
| [460]Hemiptera | [461]Whiteflies, mealybugs, scales |
| [464]Thysanoptera | [465]Thrips |
| [466]Polypodiophyta (ferns), Ophioglossaceae | [467]Molluscs | [468]Pulmonata | [469]Snails and slugs |
| [470]*Protea* spp.(sugarbush), Proteaceae | [471]Oomycota | [472]Peronosporales  [473]Pythiales | [474]*Phytopthora* spp., *Pythium* spp. |
| [475]*Rosa* spp. (rose), Rosaceae | [476]Arthropods (insects) | [477]Coleoptera | [478]Beetles |
| [481]Hemiptera | [482]Aphids |
| [485]Hemiptera | [486]Whiteflies, mealybugs, scales |
| [489]Lepidoptera | [490]Moths (e.g. Noctuidae) |
| [493]Thysanoptera | [494]Thrips |
| [496]Arthropods (mites) | [497](e.g. spider mites from family Tetranychidae) | |
| [499]Ascomycota | [500]Erysiphales (*Podosphaera*) | [501]Powdery mildews |
| [503]Oomycota | [504]Peronosporales  [505]Pythiales | [506]*Phytopthora* spp., *Pythium* spp. |
| [508]Viruses, viroids and other diseases | | |
| [509]*Solidago* spp. (goldenrods), Asteraceae | [510]Arthropods (insects) | [511]Hemiptera | [512]Bugs (e.g. Miridae) |
| [515]Hemiptera | [516]Whiteflies, mealybugs, scales |
| [519]Lepidoptera | [520]Moths (e.g. Noctuidae) |
| [523]Thysanoptera | [524]Thrips |
| [525]*Tagetes* spp. (marigold), Asteraceae | [526]Arthropods (insects) | [527]Hemiptera | [528]Whiteflies, mealybugs, scales |
| [530]Molluscs | [531]Pulmonata | [532]Snails and slugs |
| [533]*Vanda* spp. (orchid), Orchidaceae | [534]Arthropods (insects) | [535]Thysanoptera | [536]Thrips |
| [537]*Veronica* spp. (speedwell), Plantaginaceae | [538]Arthropods (insects) | [539]Coleoptera | [540]Beetles |
| [543]Thysanoptera | [544]Thrips |
| [545]*Viola* spp. (violet), Violaceae | [546]Ascomycota | [547]Helotiales (*Botrytis*) | [548]Botrytis (grey mould) |
| [549]*Zantedeschia* spp. (arum lily, calla lily, garden calla), Araceae | [550]Proteobacteria | [551]Enterobacteriales | [552]*Erwinia* spp. |

[553]Potential implementation issues

[554]This section is not part of the standard. The Standards Committee in May 2016 requested the Secretariat to gather information on any potential implementation issues related to this draft. Please provide details and proposals on how to address these potential implementation issues.