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European and Mediterranean Plant Protection Organization
Organisation Européenne et Méditerranéenne pour la Protection des Plantes PM 5/8 (1)

Lignes directrices pour l'analyse du risque phytosanitaire
Guidelines on Pest Risk Analysis

PM 5/8 (1) Guidelines on the phytosanitary measure 'Plants grown under complete physical isolation'

Specific scope

This Standard provides general and pest-specific guidance on the type of physical isolation and associated phytosanitary measures that are required to enable plants to be produced free of a particular pest in an area where the pest is present.

Specific approval and amendment

First approved in 2016-09.

1. Introduction

Pest management measures based on physical isolation are recommended in International Standards for Phytosanitary Measures such as ISPM 10 *Requirements for the establishment of pest free places of production and pest free production sites* and ISPM 36 *Integrated measures for plants for planting*. In EPPO Pest Risk Analyses (PRAs), the pest management measure referred to as 'complete physical isolation' or 'complete physical protection' is included as one of the options enabling the establishment of a 'Pest free place of production or pest free production site' in an area where the pest is present. Isolation of a place/site of production can be provided by a physical structure (called hereafter 'structure'); however, this is not always sufficient as a standalone measure to prevent a pest and/or its vector(s) from entering naturally or being introduced by human activity. Additional measures are therefore often needed to prevent pest infestation at this place/site of production (e.g. all plant material, growing medium or any other relevant material entering the place/site of production should be free from the pest or its vector(s)). This is the reason why this Standard provides guidance on these additional measures in addition to specific guidance on the type of physical isolation required. Information included in ISPM 34 *Design and operation of post-entry quarantine stations for plants* has been used to prepare this Standard, taking into account that the objective of a post-entry quarantine facility is to prevent escape of a pest, whereas the management option 'complete physical isolation' is intended to prevent the entry of a pest and/or its vector(s) into a place/site of production.

2. Objective of complete physical isolation

Plants produced commercially are often grown under protected conditions to provide a more controlled environment that favours plant growth and quality and also affords protection against potential physical damage. Preventing the entry of pest(s) or vector(s) is not the main purpose of most indoor cultivation and so the structures are not usually designed for that particular purpose. To afford complete physical isolation, therefore, dedicated and specialized facilities should be used that are suitable for the exclusion of the particular pest and/or its vector.

The objective of complete physical isolation is to ensure that plants grown within such a structure will not become infested even if the pest and/or its vector of concern is present outside in the immediate vicinity of where the structure is located. The structure used to grow plants under complete physical isolation may be constructed from a range of materials (plastic, glass, mesh, etc.) provided it can prevent the relevant pest or vector(s) from entering the structure. It should also be able to withstand physical damage (wind, hail, storms, etc.)

Complete physical isolation is an appropriate measure for pests that can spread by natural means, for example by flying or crawling, by wind or water dispersal, or by transport by vectors such as insects, birds or other animals (e.g. rodents). The requirements of complete physical isolation should take into account the growth requirements of the plants and the biology of the pests and their vectors, in particular their mode of spread.

Table 1. Recommendations on minimum measures to be requested depending on the mode of spread of pests (and their vectors)
Note that a pest may have more than one mode of spread. In this case the most stringent measures should be selected. This table should be used in conjunction with Section 3 of the text.+, minimum requirement (more stringent measures can be selected, e.g. use of a plastic structure when a net of a suitable mesh size is the minimum recommended).

	Mode of spread of pests or vectors				
Measures	Soil	Water	Air (including pathogens spread by rain, aerosols)	Small mobile arthropods (i.e. <0.2 mm in size)	Other mobile arthropods
Use of pest-free irrigation water		+			
Prevention of contact with drainage water, or lateral and vertical movement of soil water (e.g. choice of appropriate location for the place/site, creation of ditches, plants raised on benches, impermeable flooring such as a plastic cover or concrete)	+[*]	+			
Maintenance of plants in such a way that contact with soil is prevented (e.g. raised on benches, impermeable flooring such as concrete or an appropriate plastic cover)	+	+			
Cleaning and disinfection of footwear before entering the structure, or the use of dedicated footwear	+	+	+	+	
Cleaning and disinfection of machinery before entering the structure, or the use of dedicated machinery	+	+	+	+	
Cleaning and disinfection of working tools before entering the structure, or the use of dedicated working tools	+[¶]	+ [¶]	+	+	
Dedicated clothes			+	+	+[§]
Windows locked shut			+		
Windows and doors locked shut when not in use, and when open, windows fitted with appropriate screens				+	+
Protection from rain		+ [†]	+		
Double doors			+	+	+
Glass structure (or equivalent solid material)	+[‡]		+		
Plastic structure (such as polyethylene)			+	+	
Use of a net of a suitable mesh size to exclude the relevant pest(s)			Not suitable	Not suitable	+
Positive airflow at entry points			+	+	

[*]When there is a risk of presence of soil in the drainage water.
[†]For pests spread by rain.
[‡]In areas prone to strong wind which may carry soil.
[§]To be decided on a case by case basis.
[¶]If there is possible contact with soil or water.

Additional measures also need to be considered for packaging, handling and transport in order to maintain freedom of the consignment of plants from pests.

Facilities should be approved by the NPPO according to the criteria detailed in this Standard.

3. General measures that need to be implemented to guarantee and maintain pest freedom status, and to ensure that the measure 'complete physical isolation' will be effective

- The structure should be free from the relevant pest(s) or vectors before starting production.
- Access to the structure should be limited to trained and authorized personnel.
- All the host plants for planting for production that enter the structure should be free of the pest concerned and/or its vectors, and freedom should be verified prior to introduction.
- Other plants or plant products that could potentially carry the pest(s) or vectors should not be introduced into the structure (e.g. fruits for packing, storage or consumption by staff).
- Growing media or any material (e.g. plant containers and boxes) likely to carry the pest and/or its vector which are introduced into the structure should also be free from the relevant pest(s) or vector(s).
- Traceability of any plant for planting (and growing media, where appropriate) that is introduced should be guaranteed.
- The risk of entry and movement of pest(s) or vector(s) with the personnel working in the structure should be evaluated and mitigation measures taken if necessary (use of different working clothes or footwear in different areas, disinfection of hands, shoes and tools).
- The entire structure should be inspected regularly to ensure physical integrity, in particular following meteorological events. These inspections should be recorded.
- Regular inspections of all plants for signs and symptoms of pest infestation being produced under complete physical isolation should be carried out during the growing period to monitor any possible breach in the system. This should include trapping and laboratory testing of plants showing suspicious symptoms and/or where appropriate of asymptomatic plants. Inspections should be recorded.

Good production practices such as regular sanitation of the site of production (e.g. absence of weeds and cleaning or disinfection of the whole site of production at the end of production period) are also recommended. Establishment of a footbath or a foot mat at the entrance is also recommended.

Establishment of a buffer zone surrounding the structure may be appropriate, for example a host-free zone or taking control measures to reduce pest or vector prevalence.

4. Consequences of a breach

In the event of a breach (e.g. if pests or vectors are detected within the structure or there is physical damage to the integrity of the structure), plants grown within the structure should no longer be considered as free from the pest(s) or vectors. The NPPO should be notified. It is the responsibility of the NPPO to decide on the appropriate corrective action.

5. Guidance on physical structures for different types of pests

The main modes of spread of the pest should be considered when evaluating the physical structures needed. Table 1 provides recommendations on measures required depending on the mode of spread of pests (or vectors). It should be used in conjunction with the general measures described in Section 3.

For some spread mechanisms, physical structures are not needed to ensure pest freedom and the only requirements to be implemented are presented in Section 3. Examples of such pests are the following:

- Capilloviruses: these are graft and seed transmitted and the general measures described in Section 3 are sufficient alone.
- Pests transmitted by grafting and vectors only, when the vectors are absent from the area (e.g. Huanglonbing in areas where the vectors *Diaphorina citri* and *Trioza erytreae* are absent).

For pests that have the spread mechanisms outlined above and which are also mechanically transmitted, a physical structure is also not needed but disinfection of equipment should be performed.

The following categories have been identified as spread mechanisms for which a physical structure is needed. *It should be noted that a pest may have more than one mode of spread (e.g. soil borne and water borne)*

- Soil-borne pests: these are spread by or in soil or growing media (e.g. nematodes, fungi, bacteria, insects and viruses transmitted by nematodes or fungi).
- Air-borne pathogens: includes pathogens spread by wind and also by rain and aerosol (e.g. bacteria such as *Erwinia amylovora* and spores of fungi).

Note: most pathogens that are spread by splash dispersal have other spread mechanisms such as by the air or soil which would require more stringent isolation measures. For this reason, no separate category for splash dispersal is considered in this Standard.

- Water-borne pests: these are spread in surface or irrigation water (e.g. chromists such as *Phytophthora* species, bacteria such as *Ralstonia solanacearum*, *Xanthomonas* spp., viruses and viroids such as Pepino mosaic virus).
- Mobile arthropods (with a distinction based on the size).