NAPPO
North American Plant Protection Organization
Organización Norteamericana de Protección a las Plantas

NAPPO Regional Standards for Phytosanitary Measures (RSPM)

RSPM 22
Guidelines for Construction and Operation of a Containment Facility for Insects and Mites used as Biological Control Agents

The Secretariat of the North American Plant Protection Organization
1730 Varsity Drive, Suite 145
Raleigh, NC 27606-5202
United States of America

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Review

NAPPO Standards for Phytosanitary Measures are subject to periodic review and amendment. The next review for this NAPPO Standard is ADD DATE. A review of any NAPPO Standard may be initiated at any time upon the request of a NAPPO member country.

Approval

This standard was approved by the North American Plant Protection Organization (NAPPO) Executive Committee on March 19, 2021 and is effective from this date.

Virtual approval of NAPPO Products

Given the current travel restrictions brought about by the COVID-19 pandemic, the NAPPO Management Team unanimously endorsed a temporary process for virtual approval of its products.

Beginning in January 2021 and until further notice, this statement will be included with each approved NAPPO product in lieu of the Executive Committee original signature page.

Regional standard for phytosanitary measures 22 – ***Guidelines for Construction and Operation of a Containment Facility for Insects and Mites used as Biological Control Agents*** – were approved by the North American Plant Protection Organization (NAPPO) Executive Committee – see approval dates below each signature - and is effective from the latest date below.

Approved by:

Greg Wolff
Executive Committee Member
Canada
Date XXXX, 2021

Osama El-Lissy
Executive Committee Member
United States
Date XXXX, 2021

Francisco Ramírez y Ramírez
Executive Committee Member
Mexico
Date XXXX, 2021

Implementation

No Implementation Plans are required.

Amendment Record

Amendments to this Standard will be dated and filed with the NAPPO Secretariat. The most recent version will be posted on the NAPPO website at: www.nappo.org.

Distribution

Once approved, this standard is uploaded to the NAPPO website and is distributed by the NAPPO Secretariat to the Secretariat of the International Plant Protection Convention (IPPC) and to other Regional Plant Protection Organizations (RPPOs).

INTRODUCTION

Scope

These guidelines are intended to assist in the design, construction, and operation of a facility – including a laboratory or greenhouse – for the containment of exotic arthropod biological control agents. These guidelines do not pertain to the containment of animal or plant pathogens, or nematodes. Each NAPPO member country may have other or more specific containment requirements depending on the circumstances.

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Definitions, Abbreviations and Acronyms

Anteroom (syn. vestibule): A room between a containment space and corridor to ensure a buffer zone between quarantine and non-quarantine areas to prevent the escape of hitchhiker pests.

Definitions of phytosanitary terms used in this standard can be found in ISPM 5 and RSPM 5.

Background

Biological control agents are considered beneficial organisms because of their ability to control plant pests. However, these agents may have unintended consequences in the environment. NAPPO member countries have developed petition processes to ensure that possible ramifications are fully considered before exotic arthropod biological control agents are released into the environment.

As illustrated in the petition guidelines (RSPM 7 and 12), the containment of exotic biological control agents is sometimes needed. Containment may be required to ensure that unapproved agents, or potentially harmful organisms (e.g., disease, parasites, hyperparasitoids or cryptic and sibling species) are not released into the environment.

These standards recommend guidelines for maintaining the integrity of barriers between natural and contained environments to prevent the unwanted escape or introduction of exotic arthropod biological control agents or other organisms. These guidelines should be applied as appropriate by the NAPPO member countries, taking into account the circumstances including risks to plant health.

OUTLINE OF REQUIREMENTS

Information is presented on the design, construction, and operation of a containment facility for the import, housing, and culture of exotic arthropods for the biological control of insects, mites and weeds. It complements the information contained in ISPM 34: 2016, which focuses on quarantine pests on consignments of plants for planting.

Requirements

1. Physical (Design and Construction) - Exterior

1.1 The facility should be located in an area that will present minimal risks to agriculture, forestry and the environment, taking into account the organisms that will be housed in the facility.

1.2 Regulatory officials responsible for certifying the facility should be consulted before it is built.

1.3 Construction of new facilities should take into account areas prone to natural disasters and to frequent adverse weather conditions (e.g., high winds, flooding or hail) and should consider local building code measures to address the risks.

1.4 Areas surrounding a facility should be cleared of debris and vegetation. Buffer areas around the facility may be established that include sentinel plants or trap crops for monitoring based on the characteristics of the organisms.

1.5 The facility should have only one primary entry and exit. The exterior doors of the facility should be lockable.

1.6 The facility should be designed with the intended use in mind. For example, separate containment rooms should be planned if more than one organism will be housed or produced at the same time.

1.7 Location of supply and exhaust air ducts should be considered in the design of the facility to prevent outward airflow, that occurs when doors are opened, from compromising the negative air pressure system.

1.8 The movement of people and goods from and into the containment facility should be minimized, monitored, and documented (via logbooks, for example). The facility should be equipped with appropriate communication and information transfer systems.

2. Physical (Structures and Equipment) - Interior

2.1 *Surfaces* - Walls, ceilings, floors, and furnishings (benches, cupboards, etc.) should have smooth surfaces which are easily cleared, are washable and can withstand repeated cleaning and decontamination, and offer no hiding places or shadows (i.e., so arthropods on surfaces can be easily seen). Dropped ceilings should be avoided.

2.2 *Coloration* - All surfaces and furnishings, including flooring, should be in an appropriate color so that arthropods can be easily seen.

2.3 *Seals* – All seams, crevices, cracks, or other openings should be caulked, taped or otherwise sealed. Seals should be maintained throughout the life of the facility. Particular attention should be paid to service outlets (e.g., electrical, plumbing, heating, ventilation, lighting fixtures and fire sprinklers); floor drains; furnishings (benches, cupboards, etc.); and window and door frames. Electrical boxes should be sealed and electrical outlets not in use should be plugged. Sealed lighting fixtures are recommended.

2.4 *Windows* - Windows (single or double paned) should be shatter-resistant and effectively sealed to prevent arthropod escape. They should be permanently rendered inoperable or locked so they cannot be opened. If windows are used as emergency exits, they should be appropriately sealed to prevent arthropod escape while remaining functional as exits.

2.5 *Doors* (preferably solid) - A double-door system should be used so that entry to the arthropod-confinement area is through a vestibule or foyer. Each door should be self-closing and close quickly. If possible, the vestibule should have an inter-locked system whereby one door cannot be opened at the same time as the other. It is also useful to have a system where the light in the vestibule automatically goes out when the laboratory door handle is opened because most arthropods do not normally dart from lighted areas into darkness. Consideration of commercially available systems where forced air blows insects away from the doors is recommended. It is important to have negative air pressure in the facility and a means to test airflows (see section 2.11). Above all, the doors should be tight-fitting and when closed, all crevices should be sealed or covered using magnetic seal strips, brush barriers or flexible flanges, etc. It is recommended that the door does not reach the floor but has a raised sill to improve security against arthropod escape. Emergency exits should be alarmed and not blocked with equipment. Note: Door security should not be solely dependent upon electrical apparatus. Electric service is subject to interruption for various reasons and such interruption could cause a breach in security.

2.6 *Storage spaces* - Provision should be made for adequate storage to minimize clutter in the containment area. Laboratory space should only be used to store materials routinely used in the laboratory. Storage in laboratory should not exceed what is needed for daily laboratory operations.

2.7 *Light traps* - There should be regular operation of blacklight or regular light traps in the vestibule and outside the secure areas. These traps not only serve as security, but also as a continual monitoring tool to highlight problems so remedial measures can be taken. If the security system is working properly, no arthropods should be observed on the light traps. Lights should be placed inside the vestibule above the interior vestibule door, not the exterior vestibule door.

2.8 *Cages* - All cages used to house arthropods should be of sturdy simple construction, capable of being disinfected for re-use. It is recommended that cages be lockable and provide full security (e.g., sleeve cages) against arthropod escape when the entry ports are closed.

2.9 *Change rooms* - Ideally, the laboratory should be equipped with change rooms for everyone entering the facility. Such rooms should open off the vestibule so that the white lab coats and coveralls used in the arthropod-handling areas can be left in the secure area when not in use. There should be mirrors located in the vestibule for self-examination to prevent organisms from getting out. Procedures should be in place to describe the removal and treatment of personal protective equipment.

2.10 *Emergency electricity* - The facility will have containment features (negative air pressure or flow, light traps, waste treatment, etc.) that are dependent on electricity. Emergency electricity generation is necessary in case of interruption or loss of service.

2.11 *Heating, air-conditioning, and ventilation (HVAC Systems*) - Negative air pressure is recommended for the facility so that when the door is opened, air rushes in to prevent the escape of small arthropods. There should be appropriate mesh or screening (e.g., 80 Mesh or equivalent finer metallic mesh screening with 0.177mm or 0.0070 inches openings or smaller) on all vents (heating, air conditioning and ventilation), drains and cages. HEPA filters are recommended for facilities dealing very small arthropods. If fume-hoods are required in the lab, ensure they are properly sealed, filtered and screened.

Additional considerations for greenhouses: Requirements for ventilating and controlling laboratories should be considered when designing ventilation requirements for greenhouses. Construction should include screening of all forced-air and natural air venting systems. A control system that integrates lights, ventilation requirements, temperature control and shading systems should be considered when constructing a containment greenhouse. Where it is necessary to collect and treat wastewater, greenhouse floors should be sloped toward drains and have curbs to contain water. Consideration should also be given to the use of kneewalls, windbreaks and physical barriers to reduce the probability of loss of containment through mechanical damage to the greenhouse caused by machinery and carts, for example.

2.12 *Autoclaves and freezers* – Pass-through autoclaves (where both doors cannot be opened at the same time) are recommended to facilitate the secure transfer of materials out of the laboratory. If a stand-alone autoclave is included, a freezer should be available. Construction should allow space for pass-through autoclaves and freezers.

2.13. *Anterooms* – An anteroom should be incorporated in the design of new containment facilities.

3. Operation

3.1 *Supervision* - Each facility should have a designated supervisor (i.e., containment officer), with a backup as needed. This individual will be responsible for all organisms that enter, are held in, or leave the facility. The supervisor will be responsible for ensuring compliance with the regulatory requirements associated with the facility, maintaining the procedures manual, implementing the procedures, and determining individuals who are authorized to work in the facility. The technical and operational procedures provided in ISPM 34: 2010 may be used as a guide where applicable for developing a manual.

3.2 *Training* - Personnel entering the containment area should complete training in the procedures specific to the containment area. This includes training on the physical operation and design of the facility, as well as on the organism-associated hazards and precautions necessary to prevent or respond to the escape of contained organisms. Training should be documented, with refresher training planned as appropriate and needed. Training should be conducted according to the parameters set by the NPPO.

3.3 *Allowable Articles* - All persons in the facility should wear dedicated laboratory clothing (e.g., coat) appropriate to the circumstances. This clothing should remain in the facility. Unnecessary articles, including food for human consumption and personal effects (e.g., excess clothing, purses, backpacks) should not be brought into the containment area, but

should be stored outside this area. Written procedures should be established (and posted) for the movement of both persons and materials entering or leaving the containment area, including the decontamination of laboratory clothing, to prevent organism escape.

3.4 *Removal from Facility* - No living arthropods or associated organisms should be removed from the facility without the approval of the designated supervisor and the appropriate regulatory authority. Also, materials leaving the containment area should be decontaminated to ensure that no such organisms are removed inadvertently.

3.5 *Disposal/sterilization* - All packaging materials associated with the importation of exotic organisms, all rearing materials, all floor sweepings, etc., from the arthropod handling areas should be destroyed or sterilized using an effective and validated method appropriate to the circumstances (e.g., by autoclaving or incineration). If the means for decontaminating are outside the containment area, there should be a detailed Standard Operating Procedure to ensure safe handling and disposal of the materials.

3.6 *Collection/Destruction* - The laboratory should be equipped with an efficient system for collection and destruction of unwanted organisms, such as a variable vacuum system with gentle aspiration (for transfer into containers without injury to the arthropods) or for aspiration with force sufficient to kill the arthropods (when separating host arthropods from their parasites and parasitoids).

3.7 *Plumbing* – Measures should be in place to prevent the escape of living arthropods or associated organisms down the drains and into the environment. Wastewater should be treated adequately (e.g., with the use of drain meshes, plugs or by water sterilization) to prevent the escape of organisms.

3.8 *Cleaning/Decontamination* - There should be routine cleaning and decontamination of quarantine areas and equipment. There should be detailed Standard Operating Procedures for these duties. Rooms should be kept clean and free of debris. Only authorized staff should be allowed to clean the interior of the containment area.

3.9 *Recordkeeping* - Records should be kept of shipments, confirmation of identities of species, dates of import, associated organisms, destruction/sterilization of packaging, entrance of visitors and transfer of organisms to other quarantine and containment facilities.

3.10 *Incoming Shipments* - Any plant materials accompanying the shipment should be destroyed or sterilized along with the packaging. Hyperparasitoids should be killed and sent for identification. Imported organisms should be kept under strict containment until authorized for release. The organisms should complete at least one generation in containment to be sure they are not carrying any pests or diseases.

4 Security

4.1 *Emergency Action Plan* - Each facility should have an emergency action plan to be implemented in the event of organism escape. In the event of an escape, appropriate action should be taken, including clean-up, measures to prevent future escapes and immediate notification of the regulatory authorities.

4.2 *Signage* - A sign should be displayed at the entrance to the containment facility indicating that unauthorized entry is prohibited and giving contact information for the supervisor. A sign may also be desirable on the inner door of the vestibule/foyer (inside of containment and visible to personnel as they prepare to leave containment) indicating that unauthorized removal of organisms is prohibited.

4.3 *Procedures for Access* – Procedures to prevent unauthorized access to the facility should be developed and implemented.

- Entrances to the facility should be kept locked and procedures for access should be posted at entrances.
- Access should be limited to those people essential to the operation of the facility.
- Visitors should adhere to security procedures and be accompanied by authorized personnel.
- There should be a logbook to record entry and exit at the facility. The name, organization, purpose of visit, date, time in and time out should be recorded in the logbook for each visitor.