



# REFERENCE

## Use of phytosanitary treatments for plant exports

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## Purpose of this document

This document has been written for industry and authorised officers (AOs) as a reference guide to phytosanitary treatments for plant exports.

## What is a treatment?

Treatments include a range of processes targeted at the control or eradication of pests and contaminants from prescribed goods, empty containers and bulk vessels presented for export. Treatments can include, but are not limited to, any of the following measures necessary for the eradication of pests or contaminants:

- fumigation
- irradiation
- the controlling of atmosphere or temperature
- the application of a chemical substance
- dismantling, repairing, or cleaning
- repacking
- blending.

The choice of treatment applied is the responsibility of the client unless otherwise determined by legislation, the importing country, or the Australian standards.

## What standards apply to treatments?

The department maintains phytosanitary treatment application standards for several commonly applied plant export treatments:

- [Australian phytosanitary treatment application standard for cold disinfestation treatment](#)
- [Australian phytosanitary treatment application standard for vapour heat treatment](#)
- [Australian phytosanitary treatment application standard for irradiation treatment](#)
- [Australian phytosanitary treatment application standard for dimethoate dipping treatment](#)
- [Methyl Bromide Fumigation Methodology](#) and associated [Guide to performing QPS fumigations with methyl bromide](#)
- [Sulfur dioxide \(SO<sub>2</sub>\) Carbon dioxide \(CO<sub>2</sub>\) fumigation methodology](#)

## What are the treatment types?

Treatments applied to prescribed goods, empty containers or bulk vessels for plant exports are either:

- mandatory
- re-conditioning
- voluntary and commercial.

## Mandatory treatments

Mandatory treatments are treatments required by the National Plant Protection Organisation (NPPO) of the importing country, as a condition of entry for the prescribed goods. The NPPO of the importing country will specify the requirements of the treatment to be applied. These requirements can be found in the Manual of Importing Country Requirements (Micor) and will need to be complied with in order for prescribed goods to be declared export compliant.

When the NPPO of the importing country requires a treatment but does not specify treatment details (such as treatment type, dosage or exposure time) the client should confirm with the NPPO what the requirements are.

Mandatory treatments to meet importing country requirements may be one of the following:

- treatment in Australia (onshore) before phytosanitary inspection
- onshore treatment after phytosanitary inspection
- in-transit treatment after phytosanitary inspection.

If required by the NPPO of the importing country, treatment details can be endorsed on the phytosanitary certificate under the treatment section.

### **Reconditioning treatments**

Re-conditioning treatments are treatments applied to prescribed goods, empty containers or bulk vessels that have been rejected during inspection, if they are to be re-presented for export to a market requiring phytosanitary certification.

The method of reconditioning is at the client's discretion but must address all life stages of the biosecurity risk and result in the goods being export compliant.

The requirements for reconditioning treatments are outlined in the inspection Guidelines on the [Plant Export Operations Manual](#).

### **Voluntary and commercial treatments**

Voluntary and commercial treatments are treatments that are not mandatory requirements of either Australian plant export legislation or the NPPO of the importing country.

Treatment details are not certified on a phytosanitary certificate for voluntary or commercial treatments.

#### **Voluntary treatments**

Voluntary treatments:

- are initiated by the client
- may be applied as a precautionary measure to address the presence, or potential presence of pests and contaminants in the consignment, where the status of the goods may not be known
- may be used to be eligible for a reduced sampling rate for the inspection of certain prescribed goods, as advised in instructional material.

#### **Commercial treatments**

Commercial treatments are treatments that may be applied as a standard industry practice or at the request of the importer.

### **What chemicals can be used?**

The Australian Pesticides and Veterinary Medicines Authority (APVMA) requires that, if a chemical is applied, it must be registered in Australia for the particular use and must be used in accordance with its current registered label or permit conditions. The use of chemicals must also comply with various state and federally administered legislation.

If the importing country requires fumigation at rates higher than the label, the fumigator should contact the APVMA for advice prior to conducting fumigation to meet importing country requirements.

## Fumigation

Fumigation is treatment with a chemical agent that reaches the commodity and target pest/s in a gaseous state.

The fumigant may be effective against all pest groups or used to target a particular pest group; for example, arthropods or nematodes, and may address all or most life stages. The efficacy of fumigants varies greatly and may be affected by factors such as:

- the moisture content of the commodity and the amount of moisture within the enclosure used for fumigation
- the humidity, pressure, and changes in the atmospheric gas composition created by packaging or by the commodity
- commodity temperature or atmospheric temperature, as it affects the respiration rate of the target pest/s
- penetration of the fumigant
- sorption of the fumigant by the packaging or the commodity.

### What are the commonly used fumigants?

#### Methyl Bromide

Methyl Bromide is an effective fumigant for treating a wide variety of plant pests associated with a range of commodities; for example, fresh fruits and vegetables, dried fruits, nuts, cut flowers, foliage and nursery stock. It is the most frequently used fumigant due to its ability to penetrate quickly and deeply into sorptive materials at normal atmospheric pressure and to diffuse away rapidly following treatment.

Methyl Bromide is effective in treating the following pests:

- insects (all life stages)
- mites and ticks (all life stages)
- nematodes (including cyst)
- snails and slugs
- fungi.

#### Phosphine

Phosphine is one of the most relied upon fumigants to control insects in stored grains, seeds, plant products and prepared foods. Phosphine is commonly used in grain silos in a gaseous state and in accordance with the dosage rates prescribed on the label.

Milled and oily commodities such as flour, soybean meal, fish meal, nuts and oilseeds are often fumigated with phosphine because this treatment is less likely to generate undesirable residues. Phosphine is also used to treat tobacco, as the process does not result in the formation of any taints.

Phosphine is generally not considered a suitable fumigant for timber or timber articles because of concerns around its ability to penetrate these materials sufficiently.

#### Sulfur dioxide/Carbon dioxide (SO<sub>2</sub>/CO<sub>2</sub>)

Sulfur dioxide (SO<sub>2</sub>) or in combination with carbon dioxide (CO<sub>2</sub>) fumigation is an effective treatment option to prevent post-harvest decay in some commodities. For example, fumigant mixture of SO<sub>2</sub>/CO<sub>2</sub> is routinely used to treat redback spiders in table grapes exported to New Zealand.

## Irradiation

Irradiation is the treatment of product with ionising radiation by either gamma rays, electrons, or x-rays. The amount of ionising energy absorbed is termed 'absorbed dose' or 'dose' and is measured in Grays (Gy).

Irradiation has been widely accepted as a biosecurity treatment for managing the risk of arthropod pests; for example, fruit fly, in a range of fruits and vegetables such as mango, lychee, papaya, tomato and capsicum. In addition, irradiation has been extensively applied in the food industry in many countries to extend shelf life by preventing bacterial growth in the finished products. Spices and seasonings, as well as ready-to-eat meat and poultry products, are increasingly irradiated on a significant scale. However, consumer acceptance of irradiated products is still limited.

Irradiation treatment efficacy depends on factors such as the dose rate, treatment time, temperature, humidity, ventilation, and modified atmospheres.

The dose of irradiation treatment is generally pest-specific, to result in one or more of the following outcomes in the target pest/s:

- mortality
- inability to develop (for example, adult insects fail to emerge/fly or escape from the commodity)
- inability to reproduce (sterility)
- inactivation.

In plants, irradiation also serves as a devitalisation treatment, whereby seeds may germinate but seedlings do not grow; or tubers, bulbs or cuttings do not sprout.

Irradiation treatment is fast and leaves no residue and can be applied:

- as part of packing operations
- to bulk unpackaged commodities (such as grain moving over conveyor belt)
- at centralised locations such as the port of export.

## Temperature Treatment

### Vapour Heat Treatment (VHT)

VHT is the process in which water vapours are used to heat a commodity until it reaches a minimum temperature for a specified period of time to effectively control live infestations of certain pests.

In VHT, the high heat energy of hot moist air is used to raise the temperature of the commodity, allowing shorter treatment times. VHT can be applied to products of any shape or size due to its ability to penetrate to the interior of the commodity. However, the density and composition of the commodity should be considered to achieve the desired efficacy.

VHT is primarily used for commodities that are resistant to high moisture and vulnerable to drying out. This includes high-value fruit and vegetables, such as mangoes, avocados, papaya, tomatoes, zucchini and squash, that are hosts of fruit fly and flower bulbs. VHT may also be used for treating wood products.

Successful VHT treatment involves monitoring:

- humidity and air temperature within the facility
- core temperature of the commodity
- circulation of hot moist air, to maintain consistent temperature and relative humidity in the facility.

## Cold Treatment

Cold treatment uses refrigerated air to lower the temperature of a product to, or below, a specific temperature for a specific period to mitigate the risks of infestations of target pests.

Cold treatment is used primarily for fresh fruits and vegetables, such as citrus, stone fruit, grapes, kiwifruit and capsicums, that are hosts of internally feeding pests, such as fruit fly larvae.

Cold treatment is generally commodity and pest specific and involves monitoring:

- core temperature of the commodity
- air circulation, to uniformly maintain the desired temperature.

Cold treatment can be applied both onshore and in-transit, for example, in refrigerated cargo holds in vessels and refrigerated sea containers.

The treatment can be applicable to mixed consignments, for example, fresh limes and orange fruits loaded in the same facility.

Cold treatment can also be combined with other phytosanitary treatments, for example, fumigation.

## Chemical Treatment

Chemical treatments, including pesticides, fungicides and nematicides, are used on a wide range of agricultural products prior to planting and pre- and post-harvest. These treatments are intended to destroy, repel and control pests and diseases of agricultural commodities.

Chemicals are commonly applied by dipping (full immersion of the commodity into a solution) and spraying at a specific concentration for a specific period, to mitigate the risk of a broad range of pests in various field crops and pastures, fruit and vegetable crops in orchards, home gardens, flowers and ornamental plants.

Pesticides, such as dimethoate, are frequently used for post-harvest dipping of products that are susceptible to fruit fly. For example, fruits with inedible peel (avocados, banana, melons, lychee, pineapple) are routinely treated with dimethoate dipping.

Chemical treatments, such as fungicidal seed treatment, are effective in killing or inhibiting fungi or fungal spores. The application is mainly in the form of spraying or dressing the commodity.

Chemical treatments also have other applications, for example, destroying pests within the empty holds of a vessel or container. When a transport unit fails inspection due to live insect infestations, it may be sprayed with an insecticide and later be re-inspected.

## Dismantling, repairing and cleaning of products

### Dismantling

Partial or full dismantling involves teasing or slicing of a product, such as loose or baled hay, to facilitate cleaning procedures and validate and improve the efficacy of certain treatments.

### Repairing

Repairing involves the removal, replacement or reassembly of a component of units, such as wood packaging material, to meet treatment requirements. Wood packaging materials are commonly associated with exports and are frequently re-used for transporting goods. The details of treatment standards for wood packaging material are described in the [ISPM 15 – International Standards for Phytosanitary Measures – Regulation of wood packaging material in international trade](#).

Empty containers and vessel holds can also be repaired; for example, scraping/sanding areas of rust or flaking paint, re-painting and sealing gaps.

## Cleaning

Cleaning is the use of water, air or any other suitable remediation method to remove biosecurity risks from a surface.

Cleaning may include:

- pressure washing or steam cleaning
- re-processing to ensure contamination removal
- physical removal or separation of a contaminant from its original location or position
- contaminant removal by brushing, for example, of loose hay residues
- collecting the contaminants from the container doors, walls, seals, and floor either manually or through other mechanical means such as sweeping and vacuuming.

## Repacking

Repacking includes breaking the packs or fully re-processing the packaged product in a manner that meets specific commodity packaging and shipment requirements. Packaging material used for repacking should not place the acceptability of goods at risk.

## Blending

Blending can be used to bring goods with high levels of contamination back below the required numerical tolerance. It involves mixing clean goods with the contaminated product.

## Related material

The following related material is available on the [Plant Export Operations Manual](#):

- Guidelines
- Work Instructions
- References
- Australian phytosanitary treatment application standard for cold disinfestation treatment
- Australian phytosanitary treatment application standard for vapour heat treatment
- Australian phytosanitary treatment application standard for irradiation treatment
- Australian phytosanitary treatment application standard for dimethoate dipping treatment
- Methyl Bromide Fumigation Methodology
- Guide to performing QPS fumigations with methyl bromide
- Sulfur dioxide (SO<sub>2</sub>) Carbon dioxide (CO<sub>2</sub>) fumigation methodology

The following related material is available on the department's webpage:

- [ISPM 15 – International Standards for Phytosanitary Measures – Regulation of wood packaging material in international trade](#)

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