



Food and Agriculture Organization
of the United Nations

COMMISSION ON PHYTOSANITARY MEASURES RECOMMENDATION

R-03
2017

ENG

Recommendation on: Replacement or reduction of the use of methyl bromide as a phytosanitary measure

ADOPTED 2008 | PUBLISHED 2017



International Plant Protection Convention
Protecting the world's plant resources from pests

FAO encourages the use, reproduction and dissemination of material in this information product. Except where otherwise indicated, material may be copied, downloaded and printed for private study, research and teaching purposes, or for use in non-commercial products or services, provided that appropriate acknowledgement of FAO as the source and copyright holder is given and that FAO's endorsement of users' views, products or services is not implied in any way.

When this CPM recommendation is reproduced, it should be mentioned that current adopted versions of CPM recommendations are available for download on www.ippc.int/en/core-activities/governance/cpm/cpm-recommendations-1/cpm-recommendations/.

All requests for translation and adaptation rights, and for resale and other commercial use rights should be made via <http://www.fao.org/contact-us/licence-request/en> or addressed to copyright@fao.org.

FAO information products are available on the FAO website (www.fao.org/publications) and can be purchased through publications-sales@fao.org. The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO in preference to others of a similar nature that are not mentioned. The views expressed in this information product are those of the author(s) and do not necessarily reflect the views or policies of FAO.

© FAO 2008/IPPC Secretariat

Publication history

This is not an official part of the CPM Recommendation.

2008-04 first presented to CPM-3 as draft ISPM

2008-04 CPM-3 adopted the CPM recommendation on *Replacement or reduction of the use of methyl bromide as a phytosanitary measure* (R-03).

2016-12 CPM Bureau reviewed and agreed with IPPC Secretariat proposed ink amendments.

2017-04 CPM-12 agreed with the reformatting and incorporating of ink amendments.

Publication history last modified: 2017-04

BACKGROUND

This Recommendation¹ provides guidance to national plant protection organizations (NPPOs) on the replacement of or reduction in the use of methyl bromide as a phytosanitary measure in order to reduce emissions of methyl bromide².

This document is a Commission on Phytosanitary Measures (CPM) Recommendation as provided for in the International Plant Protection Convention (IPPC) Article XI.2(g).

Definitions of phytosanitary terms used in this Recommendation can be found in ISPM 5 (*Glossary of phytosanitary terms*).

The main purpose of the IPPC and the responsibility of its contracting parties is to prevent the spread and introduction of pests of plants and plant products and to promote appropriate measures for their control. In doing so, contracting parties also undertake the promotion of appropriate measures for the control of regulated pests. In its preamble, the IPPC states that in agreeing to the Convention, contracting parties take into account “internationally approved principles governing the protection of plant, human and animal health, and the environment”. The second meeting of the CPM (hereafter “Commission”) “encouraged contracting parties to promote best fumigation practices, recapture technology and development and use of alternatives to methyl bromide in phytosanitary measures where this was technically and economically feasible”. Thus, while pursuing the IPPC’s purpose, contracting parties are also encouraged to take into account environmental concerns, among which is protection of the ozone layer by reducing methyl bromide emissions.

Contracting parties may also be party to the Montreal Protocol on Substances that Deplete the Ozone Layer (hereafter “Montreal protocol”). Signatories to the Montreal protocol are obliged to protect the ozone layer by reducing, and ultimately eliminating, emissions of ozone-depleting substances through a phase-out of production and import and consumption of such substances, noting the Quarantine and Pre-Shipment (QPS³) exemptions.

In the 1992 Copenhagen amendment to the Montreal protocol, methyl bromide was listed as an ozone-depleting substance subject to phase-out provisions of the Montreal protocol. However, the use of methyl bromide for QPS purposes is currently exempt from the protocol’s phase-out provisions because of difficulties in identifying technically and economically feasible alternatives. There is currently no limit on the amount of methyl bromide that can be used for these QPS purposes. In 1999, in the Beijing amendment to the Montreal protocol, mandatory requirements for the provision of statistical data on amounts of methyl bromide used annually for QPS purposes were agreed to. This amendment entered into force in January 2001. Therefore, parties to the Montreal Protocol already have obligations to monitor and report their use of methyl bromide for QPS applications.

Methyl bromide has been widely used as a pest control treatment for many decades. It offers a broad spectrum of control for insects, nematodes, weeds, pathogens and rodents. Methyl bromide has been employed primarily as a soil fumigant before planting crops, and is also used for commodity treatment and structural fumigation. Most uses of methyl bromide as a phytosanitary measure are for the treatment of durable commodities, such as grains, cereals and dried foodstuffs, wood packaging materials, wood and logs, as well as perishable commodities, such as fruit.

It is recognized that alternatives to methyl bromide for use as phytosanitary measures are needed, particularly because there may be future restrictions on the use of methyl bromide. It is also recognized

¹ Nothing in this CPM Recommendation shall affect the rights or obligations of contracting parties under other international agreements. Provisions of other international agreements may be applicable, for example the Montreal protocol.

² This Recommendation was developed originally as an ISPM and submitted for member consultation.

³ This document refers to some terms used by the Montreal Protocol as follows: QPS (quarantine and pre-shipment) purposes, National Ozone Units. These are not IPPC terms and should not be interpreted as such.

that there is a need for contracting parties to continue to use methyl bromide until equivalent and feasible alternative phytosanitary measures are available.

Some countries have already successfully reduced or eliminated the use of methyl bromide.

To be considered viable under the IPPC, phytosanitary measures that are alternatives to methyl bromide and that are equivalent to methyl bromide fumigation as per [ISPM 24 \(Guidelines for the determination and recognition of equivalence of phytosanitary measures\)](#) should also be economically and technically feasible. In comparison, the United Nations environment programme's methyl bromide technical options committee defined alternatives as “those non-chemical or chemical treatments or procedures that are technically feasible for controlling pests, thus avoiding or replacing the use of methyl bromide”.⁴

ADDRESSED TO

Contracting parties and NPPOs.

RECOMMENDATIONS

To reduce the risk of introduction of some quarantine pests, the need for methyl bromide as a phytosanitary measure remains until a range of equivalent alternatives has been developed. Contracting parties are encouraged to put in place a strategy that will help them to reduce the use of methyl bromide for phytosanitary measures or reduce emissions of methyl bromide. This may include the following areas for action:

- replacing methyl bromide use
- reducing methyl bromide use
- physically reducing methyl bromide emissions
- accurately recording methyl bromide use for phytosanitary measures.

In developing and implementing strategies to replace or reduce methyl bromide use and reduce emissions, contracting parties should also take into account any international obligations to which they may be subject and relevant IPPC principles. These principles are described in ISPM 1 (*Phytosanitary principles for the protection of plants and the application of phytosanitary measures in international trade*).

1. Replacement of Methyl Bromide Use as a Phytosanitary Measure

In recognition of the desire to minimize the use of methyl bromide, contracting parties should, where possible, take actions to replace methyl bromide usage by increasing the application of alternative phytosanitary measures. Where methyl bromide fumigation is currently used as a phytosanitary treatment for regulated pests it may be replaced by an alternative phytosanitary measure in which no methyl bromide is used. This may involve the implementation of systems approaches, pest free areas, areas of low pest prevalence, pest free places of production, pest free production sites and equivalence.

The following are examples of phytosanitary measures that may be implemented independently or in conjunction with other phytosanitary measures to replace methyl bromide as a phytosanitary treatment when equivalent:

- (a) use of other chemicals such as treatments mentioned in Appendix 1 (e.g. sulphuryl fluoride)
- (b) application of physical treatments (e.g. heating, cooling, irradiation)
- (c) immediate commodity processing (e.g. grain being milled into flour on arrival)
- (d) methods of production (e.g. soil-free growing media, tissue culture, sterile culture).

⁴ Methyl bromide technical options committee, 1998.

In situations where consignments are identified as non-compliant at the point of import, the use of methyl bromide should be avoided where possible (appropriate actions to be taken in the case of non-compliance are described in [ISPM 20 \(Guidelines for a phytosanitary import regulatory system\)](#)).

The Commission, largely through the provisions of [ISPM 28 \(Phytosanitary treatments for regulated pests\)](#), is actively pursuing adoption of treatments that are viable alternatives to methyl bromide. As these alternatives become recognized, contracting parties are encouraged to use them in place of methyl bromide, where appropriate.

Where an ISPM contains options for various treatments for a commodity, and one of the options is methyl bromide (currently the only ISPM for which this is the case is [ISPM 15 \(Guidelines for regulating wood packaging material in international trade\)](#)) and others are considered to present less of an adverse environmental impact, parties are encouraged to use the lower-impact option(s).

[Appendix 1](#) of this Recommendation contains a list of articles that have historically been treated with methyl bromide and presents possible alternative phytosanitary treatments that could be used to replace or reduce the use of methyl bromide.

2. Reducing Volumes of Methyl Bromide Use as a Phytosanitary Measure

The reduction of methyl bromide emissions can be achieved through the use of reduced dosages of methyl bromide as a phytosanitary measure or decreased treatment frequency. In addition, existing methyl bromide use should be analysed carefully to determine if the treatment is appropriate and necessary.

The following approaches may, where appropriate, be pursued to reduce the use of methyl bromide as a phytosanitary measure:

- (a) inspection-based fumigation instead of mandatory fumigation (i.e. to detect and identify the quarantine pest of concern)
- (b) avoidance of unjustified re-fumigation with methyl bromide (i.e. re-fumigation should be used only when a quarantine pest situation is evident)
- (c) improvement of treatment facilities as appropriate to maximize efficiency of fumigation, thus reducing replenishment or re-fumigation requirements
- (d) increasing exposure time with a view to reducing dosage, where technically feasible
- (e) compliance with phytosanitary requirements for exporting commodities
- (f) avoidance of application in situations where efficacy is doubtful or marginal
- (g) re assessment of doses and exposure times in order to reduce them
- (h) use of optimal temperatures when fumigating
- (i) use of appropriately sized treatment facilities
- (j) evaluation of pest risk and treatment efficacy (through a pest risk analysis) to determine if a more appropriate dose or alternative treatment is possible.

3. Physically Reducing Methyl Bromide Emissions

Contracting parties *should aim* to minimize or eliminate the release of methyl bromide to the atmosphere by physical means. This may be achieved by upgrading facilities as appropriate to increase efficiency of methyl bromide application to improve:

- (a) methyl bromide emissions control, e.g. by recapture, or reuse or destruction, through the use of leak-proof chambers and containment/capture bubbles, etc.
- (b) fumigation performance, e.g. by use of bioassay controls where appropriate in lieu of concentration in time products, use of higher temperatures during fumigation through supplemental heat when necessary combined with air circulation, pressure testing etc., reduction of leakage
- (c) gas circulation, e.g. by use of a carrier gas such as CO₂

- (d) gas and temperature monitoring including proper calibration of equipment.

4. Recording Methyl Bromide Use as a Phytosanitary Measure

To measure progress in reduction of methyl bromide emissions arising from use of methyl bromide as a phytosanitary measure, NPPOs are *encouraged* to accurately record and collate data on current usage and share this data with their country's National Ozone Unit⁵ (the national body responsible for the implementation of the Montreal protocol).

The information on methyl bromide use for phytosanitary measures should contain:

- (a) quantities of methyl bromide used in kilograms
- (b) description of the articles⁶ fumigated where appropriate
- (c) whether the use was on import or export commodities
- (d) target pests.

5. Guidelines for Appropriate Use of Methyl Bromide as a Phytosanitary Measure

NPPOs are *encouraged* to be involved in the coordination of the following actions:

- (a) review and consider how to change phytosanitary policies (e.g. phytosanitary import requirements) to replace or reduce methyl bromide where it is required and where an equivalent, technically feasible, practical and economically viable alternative exists. This may also require review and revision of bilateral agreements between countries.
- (b) ensure that methyl bromide fumigation is used only for quarantine pests and that it is authorized or performed by the NPPO, including fumigation as emergency action for pests not previously assessed (as described in ISPM 20 (*Guidelines for a phytosanitary import regulatory system*)).
- (c) provide guidance to those responsible for methyl bromide fumigations for quarantine purposes on the importance of pursuing feasible alternative phytosanitary measures.
- (d) develop and utilize phytosanitary measures that are equivalent, viable and feasible alternatives to methyl bromide.
- (e) communicate to other NPPOs where there are viable alternatives to methyl bromide use.
- (f) submit phytosanitary treatments that are effective, efficacious, documented, feasible and applicable alternatives to the use of methyl bromide to the IPPC Secretariat using the guidelines in ISPM 28 (Phytosanitary treatments for regulated pests)
- (g) give highest priority to the development of alternative treatments for those commodities for which methyl bromide usage is high
- (h) liaise with research groups and funding bodies to develop alternative treatments as appropriate.
- (i) coordinate with the national ozone unit, as appropriate, to facilitate the annual collection and reporting of methyl bromide usage data
- (j) post or link details of NPPO-approved alternatives for methyl bromide treatment on the international phytosanitary portal (<https://www.ippc.int>) for exchange of information
- (k) cooperate with the national ozone unit to implement a strategy to replace and reduce methyl bromide usage.
- (l) exchange information on alternatives to methyl bromide usage between the NPPO and the national ozone unit
- (m) identify current treatments where methyl bromide is the only option, and provide sufficient information to the appropriate IPPC body for consideration in the development of potential viable alternatives (e.g. identify the commodity, pests associated with it for which methyl bromide is used, required efficacy)

⁵ Obligations for recording and reporting on methyl bromide usage exist under the Montreal Protocol.

⁶ The first column of the table in [Appendix 1](#) provides a list of articles commonly fumigated.

- (n) evaluate or re-evaluate pest risk (via pest risk analysis) to determine if the treatment prescription is appropriate and whether less rigorous treatment or alternative measures may be used.

RECOMMENDATION(S) SUPERSEDED BY THE ABOVE

CPM Recommendation ICPM-5/1 and CPM-1/1 are superseded.

This appendix is for reference purposes only and is not a prescriptive part of this Recommendation.

APPENDIX 1: Examples of potential phytosanitary treatments to replace or reduce methyl bromide.

Listed in the table below are treatments that may be considered and validated as alternatives to methyl bromide and that are currently registered, where necessary, and used in at least one country⁷. These treatments may be employed to replace or reduce methyl bromide use in certain circumstances. Alternatively, phytosanitary measures may be considered, including pest free areas, areas of low pest prevalence and system approach, as alternatives for some of the treatments listed below. The use of the names of the articles presented in this appendix may be helpful for ensuring consistency in reporting QPS use.

The following considerations affect the choice of a measure:

- (1) combination of crop type (flowers, fruits, foliage etc.) or species and pest species (insects, bacteria, fungi, virus etc.)
- (2) lack of a national registration or existing equivalency agreement between countries, which may preclude use of particular treatments in particular countries
- (3) economic factors that may affect use of the treatment in particular countries
- (4) processes in the supply chain that may reduce pests to an acceptable level (e.g. washing, freezing, dicing)
- (5) occurrence of resistance of a pest towards the envisaged alternative, which may change the necessary dosage schedule or preclude the alternative
- (6) irradiation (it may not kill immature stages but it rather inhibits development to maturity)
- (7) intended use of the commodity
- (8) undesirable effects of chemical residues for operators
- (9) provisions in relevant ISPMs
- (10) other treatments that may be agreed to by countries based on bilateral agreements.

Table 1. List of examples of potential phytosanitary treatments to consider to replace or reduce methyl bromide for commodities, structures and equipment and other items.

List of articles fumigated	Examples of potential phytosanitary treatments to consider to replace or reduce methyl bromide
Commodities	
Bulbs, corms, tubers and rhizomes (intended for planting)	Hot water, pre-plant quarantine soil sterilization (steam or chemical), pesticide dip, or a combination of these treatments
Cut flowers and branches (including foliage)	Controlled atmosphere (CO ₂ , N ₂) + combination treatment, hot water, irradiation, phosphine, phosphine/carbon dioxide mixture, pyrethroids + carbon dioxide, ethyl formate + carbon dioxide
Fresh fruit and vegetables	Cold treatment, high-temperature forced air, hot water, irradiation, quick freeze, vapour heat treatment, chemical dip, phosphine, combination of treatments
Grain, cereals and oil seeds for consumption including rice (not intended for planting)	Heat treatment, irradiation, ethyl formate, carbonyl sulphide, phosphine, phosphine + carbon dioxide, controlled atmosphere (CO ₂ , N ₂)

⁷ The treatments indicated in the table below may not have been adopted by CPM.

List of articles fumigated	Examples of potential phytosanitary treatments to consider to replace or reduce methyl bromide
Commodities	
Dried foodstuffs (including herbs, dried fruit, coffee, cocoa)	Heat treatment, carbon dioxide under high pressure, irradiation, ethyl formate, ethylene oxide, phosphine, phosphine + carbon dioxide, controlled atmosphere (CO ₂ , N ₂), sulfuryl fluoride, propylene oxide
Nursery stock (plants intended for planting other than seed), and associated soil and other growing media	Hot water, soil sterilization (steam or chemical e.g. methyl isothiocyanate (MITC) fumigants), pesticides dip, phosphine, combination of any of these treatments
Seeds (intended for planting)	Hot water, pesticide dip or dusting, phosphine, combination treatments
Wood packaging materials ⁸	Heat treatment (contained in Annex 1 of ISPM 15). Further alternative treatments may be added in the future.
Wood (including round wood, sawn wood, wood chips)	Heat treatment, kiln-drying, removal of bark, microwave, irradiation, MITC/sulfuryl fluoride mixture, methyl iodide, chemical impregnation or immersion, phosphine, sulfuryl fluoride
Whole logs (with or without bark)	Heat treatment, irradiation, removal of bark, phosphine, sulfuryl fluoride
Hay, straw, thatch grass, dried animal fodder (other than grains and cereals listed above)	Heat treatment, irradiation, high pressure + phosphine, phosphine, sulfuryl fluoride
Cotton and other fibre crops and products	Heat treatment, compression, irradiation, phosphine, sulfuryl fluoride
Tree nuts (almonds, walnuts, hazelnuts etc.)	Carbon dioxide under high pressure, controlled atmosphere (CO ₂ , N ₂), heat treatment, irradiation, ethylene oxide, ethyl formate, phosphine, phosphine + carbon dioxide, propylene oxide, sulfuryl fluoride
Structures and equipment	
Buildings with quarantine pests (including elevators, dwellings, factories, storage facilities)	Controlled atmosphere (CO ₂ , N ₂), heat treatment, pesticide spray or fogging, phosphine, sulfuryl fluoride
Equipment (including used agricultural machinery and vehicles), empty shipping containers and reused packaging	Controlled atmosphere (CO ₂ , N ₂), heat treatment, steam, hot water, pesticide spray or fogging, phosphine, sulfuryl fluoride
Other items	
Personal effects, furniture, crafts, artefacts, hides, fur and skins	Controlled atmosphere (CO ₂ , N ₂), heat treatment, irradiation, ethylene oxide, pesticide spray or fogging, phosphine, sulfuryl fluoride

⁸ It is noted that ISPM 15 is the only ISPM currently listing approved treatments for wood packaging material. Wood packaging material is the only commodity for which specific treatments are currently described in an ISPM

References

- IPPC.** 1997. *International Plant Protection Convention*. Rome, IPPC, FAO.
- IPPC.** 2007. *Report of the Second Session of the Commission on Phytosanitary Measures*. Rome, IPPC, FAO.
- ISPM 1.** 2006. *Phytosanitary principles for the protection of plants and the application of phytosanitary measures in international trade*. Rome, IPPC, FAO.
- ISPM 4.** 1995. *Requirements for the establishment of pest free areas*. Rome, IPPC, FAO.
- ISPM 5.** *Glossary of phytosanitary terms*. Rome, IPPC, FAO.
- ISPM 10.** 1999. *Requirements for the establishment of pest free places of production and pest free production sites*. Rome, IPPC, FAO.
- ISPM 11.** 2004. *Pest risk analysis for quarantine pests including analysis of environmental risks and living modified organisms*. Rome, IPPC, FAO.
- ISPM 14.** 2002. *The use of integrated measures in a systems approach for pest risk management*. Rome, IPPC, FAO.
- ISPM 15.** 2013. *Guidelines for regulating wood packaging material in international trade, with modifications to Annex 1, 2006*. Rome, IPPC, FAO.
- ISPM 20.** 2004. *Guidelines for a phytosanitary import regulatory system*. Rome, IPPC, FAO.
- ISPM 21.** 2004. *Pest risk analysis for regulated non-quarantine pests*. Rome, IPPC, FAO.
- ISPM 22.** 2005. *Requirements for the establishment of areas of low pest prevalence*. Rome, IPPC, FAO.
- ISPM 23.** 2005. *Guidelines for inspection*. Rome, IPPC, FAO.
- ISPM 24.** 2005. *Guidelines for the determination and recognition of equivalence of phytosanitary measures*. Rome, IPPC, FAO.
- ISPM 28.** 2007. *Phytosanitary treatments for regulated pests*. Rome, IPPC, FAO.
- UNEP** (United Nations Environment Programme). 1992. *The Copenhagen Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer*. Agreed by the Fourth Meeting of the Parties to the Montreal Protocol, Copenhagen, 23–25 November 1992. Nairobi, UNEP Ozone Secretariat.
- UNEP** (United Nations Environment Programme). 1998. *Report of the Methyl Bromide Technical Options Committee. Assessment of Alternatives to Methyl Bromide, 30 October 1998*. Nairobi, UNEP Ozone Secretariat. 354 pp.
- UNEP** (United Nations Environment Programme). 2000. *The Montreal Protocol on Substances that Deplete the Ozone Layer*. Nairobi, UNEP Ozone Secretariat. Available at <http://ozone.unep.org/pdfs/Montreal-Protocol2000.pdf> (last accessed 6 April 2017).

This page is intentionally left blank

IPPC

The International Plant Protection Convention (IPPC) is an international plant health agreement that aims to protect cultivated and wild plants by preventing the introduction and spread of pests. International travel and trade are greater than ever before. As people and commodities move around the world, organisms that present risks to plants travel with them.

Organization

- ◆ There are over 180 contracting parties to the IPPC.
- ◆ Each contracting party has a national plant protection organization (NPPO) and an Official IPPC contact point.
- ◆ Nine regional plant protection organizations (RPPOs) work to facilitate the implementation of the IPPC in countries.
- ◆ IPPC liaises with relevant international organizations to help build regional and national capacities.
- ◆ The Secretariat is provided by the Food and Agriculture Organization of the United Nations (FAO).

Food and Agriculture Organization of the United Nations

IPPC Secretariat

Viale delle Terme di Caracalla, 00153 Rome, Italy

Tel: +39 06 5705 4812

Email: ippc@fao.org | Web: www.ippc.int

