

Japan National Management Strategy for Phase-out of Critical Uses of Methyl Bromide Revised Edition

Ministry of Agriculture, Forestry and Fisheries, Japan

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1. Background of the nomination for critical use exemption in Japan

Reduction of methyl bromide in accordance with the Montreal Protocol

It has been agreed in the Montreal Protocol on Substances that Deplete the Ozone Layer that production and consumption of ozone-depleting substances be phased out; control measure on methyl bromide was introduced by the Copenhagen Amendment in 1992. It was further reinforced by the Vienna Adjustment in 1995 and successively by the Montreal Amendment in 1997, so that the production and consumption of methyl bromide be completely phased out in 2005 in countries not operating under paragraph 1 of Article 5 of the Protocol with the intermediate steps as presented in Table 1.

In Japan, the production and consumption of methyl bromide was frozen in 1995 at the level in 1991 and since then, has been reduced annually by five percent of the base level during 1996 through 1998 prior to the first reduction step by 25% in 1999. Additionally, the production and consumption has been reduced in accordance with the schedule set out in the Montreal Protocol since 1999 and completely phased out in 2005 except for quarantine use and critical uses. The original target and the performance Japan achieved for the reduction of methyl bromide are also provided in Table 1.

Table 1: Schedule and performance for the phase-out of methyl bromide

	Montreal Protocol for Non A5 Parties	Japan		
	Schedule	Own target	Performance	
			Production	Consumption
1995	Freeze at the level of 1991	Freeze at the level of 1991	- 6%	- 2%
1996		- 5%	- 11%	- 7%
1997		- 10%	- 14%	- 9%
1998		- 15%	- 19%	- 15%
1999	- 25%	- 25%	- 28%	- 25%
2000		- 30%	- 33%	- 30%
2001	- 50%	- 50%	- 52%	- 53%
2002		- 50%	- 53%	- 52%
2003	- 70%	- 70%	- 74%	- 77%
2004		- 70%	- 73%	- 72%
2005 *	- 100%	- 100%	- 100%	- 100%

* The production and consumption of critical use exemption are not included.

Progress in adoption of methyl bromide alternatives and critical uses

As a result of development of alternatives to methyl bromide in Japan in order to comply with the phase-out schedule set out in the Montreal Protocol, the prevention of soil diseases in many crops such as tomato and strawberry has become achievable by adopting alternative pesticides such as chloropicrin. However, no technically and economically feasible alternatives are still available for the following sectors:

- (1) Control of soil-transmitted viruses in cucurbits and peppers as well as *Curculio dentipes* that damages chestnut fruit
 - At present, no registered substitutes or alternatives to methyl bromide are available.
- (2) Control of rhizome rot in ginger

- Since the currently registered alternative pesticides require longer processing periods compared to methyl bromide, the adoption of these pesticides leads to economic loss due to the yield reduction resulted from the delay in ginger planting.
- Although transition to alternative pesticides has been promoted, no efficacy of the alternative pesticides is gained in some areas due to their soil conditions, and the efficacy of alternative pesticides is deteriorated in other areas because resistant strains have occurred.

Therefore, the government currently classifies these applications as “critical uses” and nominates the critical use exemption for approval.

Trend in the quantity of methyl bromide nominated and approved for critical use exemption in Japan

The trend in the quantity of methyl bromide nominated for the critical use exemption in Japan is provided in Table 2. The quantity of methyl bromide approved for the critical use exemption in Japan as of September 2007 is provided in Table 3. These tables show that the quantity approved for each year does not exceed the quantity nominated for the previous year.

Table 2: Trend in the quantity of methyl bromide nominated for critical use exemption in Japan (unit: ton)

	2005	2006	2007	2008	2009
Cucumber	88.300	88.800	72.400	68.600	61.400
Ginger (field)	119.400	119.400	112.200	112.100	102.200
Ginger (protected)	22.900	22.900	14.800	14.800	12.900
Melon	194.100	203.900	182.200	182.200	168.000
Peppers	187.200	200.700	169.400	162.300	134.400
Watermelon	129.000	98.900	94.200	43.300	23.700
Chestnut	7.100	6.800	6.500	6.300	5.800
Total Amount	748.000	741.400	651.700	589.600	508.400
Ratio to reference value(6,107tons) (%) *	12.2	12.1	10.7	9.7	8.3

* Reference value: 6,107tons (the consumption level in 1991)

Table 3: Trend in the quantity of methyl bromide approved for critical use exemption in Japan (unit: ton)

	2005	2006	2007	2008	2009
Cucumber	88.300	88.800	72.400	51.450	34.300
Ginger (field)	119.400	119.400	109.701	84.075	63.056
Ginger (protected)	22.900	22.900	14.471	11.100	8.325
Melon	194.100	203.900	182.200	136.650	91.100
Peppers	187.200	200.700	156.700	121.725	81.149
Watermelon	129.000	98.900	94.200	32.475	21.650
Chestnut	7.100	6.800	6.500	6.300	5.800
Total Amount	748.000	741.400	636.172	443.775	305.380
Ratio to reference value(6,107tons) (%)	12.2	12.1	10.4	7.3	5.0

2. Development of National Management Strategy for Phase-out of Critical Uses of Methyl Bromide and its follow-up

Necessity for national management strategy

The Extraordinary Meeting of the Parties decided, in its decision Ex.II/4, to request each Party which makes a critical use nomination after 2005 to submit a national management strategy for phase-out of critical uses of methyl bromide to the Ozone Secretariat before 1, February 2006. In this decision, the national management strategy was to aim, among other things;

- (a) To avoid any increase in methyl bromide consumption except for unforeseen circumstances;
- (b) To encourage the use of alternatives through the use of expedited procedures, where possible, to develop, register and deploy technically and economically

- feasible alternatives;
- (c) To provide information, for each current pre-harvest and post-harvest use for which a nomination is planned, on the potential market penetration of newly deployed alternatives and alternatives which may be used in the near future, to bring forward the time when it is estimated that methyl bromide consumption for such uses can be reduced and/or ultimately eliminated;
 - (d) To promote the implementation of measures which ensure that any emissions of methyl bromide are minimized; and
 - (e) To show how the management strategy will be implemented to promote the phase-out of uses of methyl bromide as soon as technically and economically feasible alternatives are available, in particular describing the steps which the Party is taking in regard to subparagraph (b)(iii) of paragraph 1 of decision IX/6 in respect of research programmes in non-Article 5 Parties and the adoption of alternatives by Article 5 Parties;

Establishment and follow-up of national management strategy

In response to the decision Ex.II/4, Japan established its national management strategy and submitted it to the Ozone Secretariat on 31 January, 2006. As several progresses have been made and the circumstances have been changed, Japan has reviewed the original strategy and made some revisions.

To ensure continued reduction in quantity of methyl bromide used in critical uses, the government will continue to implement this strategy and regularly check the progress made in order to take appropriate follow-up actions including the review of the strategy based on the results.

3. Setting up of indicative targets for phase-out of critical uses of methyl bromide

The Ministry of Agriculture, Forestry and Fisheries established "Technical Investigation Committee on Critical Uses of Methyl Bromide" which consists of experts on disease and pest control from national institutes and prefectural governments to set up indicative targets for phase-out of critical uses of methyl bromide based on the

examination by the committee. It is especially difficult in Japan to immediately convert methyl bromide to alternatives in a uniform manner throughout the country because of the different conditions in each region including field conditions and climate. Therefore, the committee will develop "regional programmes" with consideration of regional circumstances and combination of various alternatives to achieve complete phase-out.

(1) Soil-transmitted viruses in melon, watermelon, cucumber and peppers

The indicative target in this sector is to accomplish the complete phase-out in 2013, taking into account the period needed for penetration of and transition to techniques for reducing methyl bromide use in all regions.

In order to achieve this goal, the government will develop such techniques by combining various alternatives that have been developed so far.

Alternative techniques to be applied for the phase-out of methyl bromide of critical uses are as follows:

- (a) Thorough seed control for the prevention of the pathogenic viruses from being carried in;
- (b) Field sanitation practice such as removal of previous crop debris that may cause transmission and immediate removal of infected plants;
- (c) Introduction of resistant varieties;
- (d) Grafting with resistant rootstocks;
- (e) Introduction of physical prevention methods such as steam treatment on the isolated tray culture;
- (f) Trial to prevent contact between root and soil by planting the seedlings in paper pots for preventing pathogenic viruses from infection through the root at planting; and
- (g) Introduction of simple substrate cultivation replacing soil with alternative substrates such as rice husks, palm shell, tree bark and rock wool.

(2) Rhizome rot in ginger

The indicative target in this sector is to accomplish the complete phase-out in 2013, taking into account the period needed for penetration of and transition to techniques

for reducing methyl bromide use in all regions.

In order to achieve this goal, the government will develop such techniques by combining various alternatives that have been developed so far.

Alternative pesticides and techniques to be applied for the phase-out of methyl bromide of critical use are as follows:

(a) Registered alternative pesticides for soil treatment prior to planting:

Chloropicrin,
Mixture of 1,3Dichloropropene +Chloropicrin,
Mixture of 1,3Dichloropropene +Methyl isothiocyanate,
Dazomet, and
Metham sodium

(b) Registered alternative pesticides for the application during crop standing:

Cyazofamid,
Metalaxyl, and
Propamocarb

(c) Alternative pesticides under test in order to apply for agrochemical registration:

Methyl iodide,
Phosphorous acid; and
Mixture of azoxystrobin + metalaxyl M and so forth

(d) Planting disease free seed rhizome cultivated in the isolated field;

(e) Field sanitation practice by immediate removal of infected plants; and

(f) Introduction of physical alternatives such as hot water treatment

(3) Chestnut weevil that damages chestnut fruit

Technically and economically feasible alternatives shall be established and introduced soon after the completion of the registration of a new pesticide (i.e. methyl iodide) which is currently in the evaluation process for agrichemical registration.

The government will endeavor to ensure the penetration of the alternatives throughout fields of chestnut fumigation in 1 or 2 years if possible, or in 3 years at latest, after such alternatives are established.

4. Details of the National Management Strategy for promoting specific measures for complete phase-out

The government will take the following measures for reducing the quantity of critical uses of methyl bromide, fulfilling the five objectives specified in the decision Ex.I/4 by the Extraordinary Meeting of the Parties and reproduced in section 2:

(a) Measures taken to avoid any increase in methyl bromide consumption except for unforeseen circumstances

Until the accomplishment of the complete phase-out, the government will continue to make efforts to keep the quantity for critical use nomination not exceeding the quantity approved for each crop for the previous year, except for unforeseen circumstances such as spread of pest insects and disease outbreak and the cancellation of registered alternative pesticides. The government will determine the quantity for critical use nomination, based on the full examination of steps to introduction of the alternative technologies and emission reduction methods which are taken by the stakeholders in the nominating prefecture, in the light of measures prescribed in the items from (b) to (e) below.

(b): Measures taken to encourage the use of alternatives through the use of expedited procedures, where possible, to develop, register and deploy technically and economically feasible alternatives:

1. Reduction in the number of tests required for registration of alternative pesticides

The national institute that takes responsibility for registration of agrichemicals promotes registration of alternative pesticides by accepting applications with reduction of the required efficacy/phytotoxicity tests from the conventional 6 cases to 4 cases for those who expand the subject pests and disease of alternative pesticides to include current critical uses.

2. Preferential review of the application for registration of alternative pesticides

The national institute that takes responsibility for registration of agrichemicals gives priority to the registration processes of alternative pesticides. Specifically, examination for registration of alternative pesticides such as methyl iodide is prioritized against other pesticides by the institute.

(c): Measures taken to provide information, for each current pre-harvest and post-harvest use for which a nomination is planned, on the potential market penetration of newly deployed alternatives and alternatives which may be used in the near future, to bring forward the time when it is estimated that methyl bromide consumption for such uses can be reduced and/or ultimately eliminated

1. Seminars to the applicants for the critical use exemption

The government has held a seminar on the critical use nomination of methyl bromide, targeting prefectural governments every year since 2005, in order to explain the current international situation and the importance of further efforts for the reduction. It is highly expected that penetration of alternatives could be promoted by improvement of applicants' understanding or awareness of the situation given through explanation of prefectural governments.

The government will outreach the target of these seminars to the applicants for the critical use exemption, directly explaining the importance of efforts for the reduction and providing information on applicable alternatives. In addition, the government will endeavor to hold seminars on introduction of effective alternatives on a regional basis.

2. Symposiums and forums to introduce alternatives

Research institutes and other organizations related to methyl bromide have held technical symposiums and open forums to introduce alternatives. Symposiums and forums held recently are presented below. In addition, alternatives have been taken up in some of other symposiums on plant protection as well.

(1) To show the principle and effective practices of the hot water treatment with field demonstration, inviting farmers and those in charge of pest control in the prefectural

governments, in the exhibition and demonstration symposium on soil disinfection with hot water treatment held by Japan Greenhouse Horticulture Association in 2002.

(2) To introduce the alternatives and their penetration, inviting those in charge of pest control in the prefectural governments in the workshop held by National Institute of Vegetable and Tea Science in October 2005.

(3) To explain the further penetration and safe use of chloropicrin, inviting those in charge of pest control in the prefectural governments in the training seminars held by Japan Fumigation Technology Association every year since 2003.

(4) To enhance the understanding of alternatives, inviting research institutes, agricultural manufacturers and those in the symposium held by Hounoukai on 28th September 2007.

The government will urge the research institutes and other relevant organizations to hold workshops on the effectiveness and practices of alternatives under development for the critical uses of methyl bromide in every occasion in order to ensure the further understanding by farmers, and to promote the penetration of alternatives.

<p>(d): Measures taken to promote the implementation of measures which ensure that any emissions of methyl bromide are minimized</p>
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The government has promoted emission control and rational use of methyl bromide by the users, based on the "Guidelines for Emission Control and Rational Use of Specified Substances", which was developed pursuant to the "Law concerning the Protection of the Ozone Layer through the Control of Specified Substances and Other Measures."

Especially, following measures are taken to reduce the dosage of methyl bromide by provision, deployment and intake of low permeable barrier film.

"Guidelines for Emission Control and Rational Use of Specified Substances" (Extracts of articles related to methyl bromide)

Measures to control the emission and rationalize the use of methyl bromide for soil fumigation

Those who use methyl bromide for soil fumigation in order to control soil pests and so forth should take the following measures to control the emission and rationalize the use:

- (a) To minimize the frequency and quantity of methyl bromide use, with consideration of the relevant factors such as the type of pests and the extent of the occurrence;
- (b) To fully till the field to be fumigated in order to ensure the penetration of methyl bromide into the ground;
- (c) To use films with high gas retention properties as covering materials, to inspect and repair the defective parts of covering materials and to hold the ends of materials well with soil, in order to improve the sealing; and
- (d) To keep the coverage with covering materials as long as possible.

*Note: In the extracts of articles above, the words of "specified substance" in the original text are replaced with "methyl bromide".

1. Encouragement of the use of low permeable barrier film

According to the "Technical Guidance on Agricultural Production" issued in April 2007, the government encourages the prefectural governments to direct farmers to take necessary measures for controlling the emission of fumigants, such as covering the fumigated soil with films for the period indicated in the label of containers of the fumigants.

2. Further guidance on the use of low permeable barrier film to prefectural governments

The government held a seminar on the nomination for the critical use exemption of methyl bromide in June 2007, targeting the prefectural governments nominating the critical use exemption, and gave guidance on the use of lower permeable barrier film as the Methyl Bromide Technical Options Committee (MBTOC) requests to introduce the film as one of the effective method for the further reduction of methyl bromide use. The government will continue to give guidance on this matter.

3. Identification of problems on the use of low permeable barrier film and efforts for their solution

The government conducted a questionnaire survey in August 2005 for the prefectural governments who requested the methyl bromide critical use exemption, on whether they had a willingness to reduce the emission of methyl bromide by covering soil with low permeable barrier film.

The results showed that despite their willingness to introduce low permeable barrier film in using methyl bromide in the future, significant improvement is needed in its sufficient supply, improvement of easily tearing physical properties, and lower price as well. The government will continue to encourage the film manufacturers to make efforts to resolve these problems and to promote the use of low permeable barrier film and control the emission of methyl bromide making the best use of the results of the survey.

4. Increase of production capacity of low permeable barrier film manufacturers

In response to the government's enquiry, the existing low permeable barrier film manufacturers does not show their willingness to increase the production capacity because the future quantity of the critical use exemption of methyl bromide has uncertainties, and they show negative stance for lowering the price due to the escalating price of crude oil and the plant specificity.

The government will endeavor to identify other manufacturers who may start to manufacture the film, in order to improve the availability

5. Approaches in the national subsidized projects

The government subsidized a project to develop and demonstrate the technologies for reducing the use of methyl bromide through the use of low permeable barrier film in FY2006. The government will promote the demonstration and introduction of the technologies on a regional basis, based on the result of the subsidized project.

(e): Measures taken to show how the management strategy will be implemented to promote the phase-out of uses of methyl bromide as soon as technically and economically feasible alternatives are available, in particular describing the steps which Japan is taking in regard to subparagraph (b)(iii) of paragraph 1 of decision IX/6 in respect of research programmes

1. *Research programme on alternatives*

The government is currently planning to establish the following alternatives to methyl bromide, as part of the establishment of the environment-friendly agricultural production system tailored to regional uniqueness, in the research and development for the productivity improvement and sustainable development of agriculture, forestry and fisheries.

- (1) Development of the control system with the application of attenuated virus against *Pepper mild mottle virus* (PMMoV) etc.
- (2) Development of field-level disease control system against the difficult-to-control diseases, with the combination of the technology for diagnosing the soil disease infection and the application of attenuated virus

2. *Alternatives under development*

The agrichemical manufacturers, the national institutes and the local institutes in prefectural governments carry out the following activities related to the development of alternatives.

- (1) Development of alternative pesticides for the control of rhizome rot disease of ginger
 - Methyl iodide (under registration application)
 - Amisulbrom (under testing)
 - Mixture of Azoxystrobin + Metalaxyl-M (under testing)
 - Phosphorus acid (under testing)
- (2) Development of an alternative pesticide for the control of a *Melon necrotic spot virus* (MNSV) of melon
 - Methyl iodide (under registration application)
- (3) Development of an alternative pesticide for the control of chestnut weevil
 - Methyl iodide (under registration application)
- (4) Development of resistant varieties

Development of resistant green pepper varieties with *L^A* gene against *Pepper mild mottle virus* (PMMoV), such as “Pagu No1” and “*L^A* Miogi”

- (5) Development of attenuated soil-transmitted viruses
Development of seedlings vaccinated against CGMMV to melon and PMMoV to green pepper
- (6) Identification of antagonistic microorganisms to prevent soil-transmitted diseases and development of the technologies applying the microorganisms
- (7) Development of the techniques to prevent contact infection of virus
 - (a) Disinfection of scissors prior to the harvest of fruits
 - (b) Development of nursery seedling transplanting paper pot technology to prevent contact infection of green pepper
- (8) Development of chestnut dipping method in hot water
Development of technology to control chestnut weevil with hot water dipping treatment at the temperature of 50 degree Celsius for thirty minutes

3. Establishment of a conference to address reduction of critical uses of methyl bromide

In February 2000, the government established the "conference on measures for the reduction of methyl bromide" which consists of national administration, research institutes and organizations related to methyl bromide, to address the phase-out of production and consumption of methyl bromide by 2005. The conference has worked, under the mutual cooperation among stakeholders, for reinforcing the measures for development and penetration of alternatives and providing information to prefectural governments.

Furthermore, after the phase-out of production and consumption of methyl bromide, the government has established the "investigation committee on methyl bromide techniques for critical uses" which consists of experts in pest control from national institutes and prefectural governments in November 2006 in order to examine the technical issues of critical use nominations and to positively promote penetration of alternatives.

4. Approaches in development and penetration of alternatives under public-private cooperation

The government has tackled development and penetration of alternatives on a regional basis from the viewpoint of environmental protection, classifying this technology as one of the "key technologies" which need full cooperation among the national government, related organizations, private companies and other stakeholders in an important field of agriculture. The efforts resulted in new registration and/or expansion in applications of seven alternative pesticides and compilation of leading cases for introduction of alternative methods into the cultivation field in the period from 2001 to 2004. The government will further deploy the alternatives in each region under close cooperation with prefectural governments, applying this "key technology."

5. Implementation of subsidized projects for development of alternative pesticides through a quick launch project for alternatives

Japan Fumigation Technology Association promoted development of alternative pesticides, receiving subsidies from the national government, and expanded applications of seven pesticides as is presented in subsection 4 above, during the period from 2001 to 2004, two of which were registered as new pesticides. The association will encourage the agrichemical manufacturers to expand applications of registration, taking into account the needs in each region.

6. Demonstration of alternatives on a regional basis

For the purpose of attaining sufficient information on the approach to methyl bromide reduction in the area requesting the critical use exemption, the government conducted a survey in August 2005, on how the areas are tackling the reduction of methyl bromide use. The survey showed that despite the efforts made by all the areas, transition to efficient alternative method does not necessarily occurred because technically and economically feasible alternative technology is not available to the farmers in those areas or the existing alternative pesticides do not have sufficient efficacy. Furthermore, as each area has its unique cropping pattern and harvest timing, it is found difficult to set a universal national reduction goal for each crop at present. Under these circumstances, some areas endeavor to demonstrate an alternative method tailored to the regional conditions and lead to the penetration of the method.

As mentioned previously, the government will take necessary actions for the further

promotion of the introduction of alternatives through the programmes tailored to the regional conditions, and, under cooperation with prefectural governments, support the programmes through prompt compilation of the progress and achievements in each area and providing the information.

Alternatives that are currently demonstrated by local areas and are expected to be prospective are shown bellow:

- Efficacy test of methyl iodide fumigation in controlling chestnut weevil;
- Efficacy test of the storage under low temperature and high humidity in controlling chestnut weevil;
- Review on the new resistant varieties of melon against *Melon necrotic spot virus* (MNSV);
- Review on the field-base test for demonstration of the efficacy of resistant stock against *Melon necrotic spot virus*(MNSV); and
- Field test on the introduction of green pepper resistant varieties with *L⁴* gene against *Pepper mild mottle virus* (PMMoV)