EUROPEAN COMMUNITY MANAGEMENT STRATEGY FOR THE PHASE-OUT OF THE CRITICAL USES OF METHYL BROMIDE

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Acronyms

AFR	Accounting Framework Report on the use of MB for CUEs
COM	European Commission
CUE	Critical use exemption
CULA	Critical Use Licence Assessment
CUN	Critical use nomination
CUNA	Critical Use Nomination Assessment
EC	European Community
ECMS	European Community Management Strategy for the Phase-out of Critical Uses of Methyl Bromide
IPM	Integrated pest management
kg	Kilograms
m^3	Cubic metres
MB	Methyl bromide
MBTOC	Methyl Bromide Technical Options Committee
MOP	Meeting of the Parties of the Montreal Protocol
MS	Member State of the European Community
NMS	National Management Strategy
PCO	Pest control operators
t	tonnes
TEAP	Technology and Economic Assessment Panel
UNEP	United Nations Environment Programme
VIF	Virtually impermeable film – sheets that are placed on the soil to retain gases while conducting soil fumigations

Executive Summary

The Executive Summary highlights key features of the European Community Management Strategy. For further details, please refer to the chapters in the main report, and the attached Annexes

Methyl bromide (MB) is a highly toxic pesticide used in the past mainly for effectively controlling soil-borne fungal and bacterial pathogens, nematodes and weeds prior to planting various crops such as strawberries, and used for controlling insects, mites and rodents in food facilities such as flour mills and in commodities such as dried fruit. MB was officially added to the Montreal Protocol in 1992 because it is a potent ozone-depleting substance. MB was phased-out on 1 January 2005 in all industrialised countries[1], except when 'critical uses' are authorised under the Protocol for specific circumstances where technically and economically feasible alternatives are not immediately available. Critical uses are therefore intended to be strictly limited and temporary derogations from the phase out of MB.

The "European Community Management Strategy for the Phase Out of the Critical Uses of Methyl Bromide" (ECMS) was submitted to the Ozone Secretariat pursuant to Decision Ex.I/4(3) of the Montreal Protocol. Decision XIX/9(12) states that parties should continue to ensure that management strategies address the aims specified in Decision Ex.I/4(3). The ECMS was designed to be a "living document" and was updated annually in the period 2005-2009 until the completion of the phase out.

The ECMS describes the process and conditions that were put in place in the European Community for reviewing requested critical uses and agreeing an eligible amount of MB for CUEs at the Community level in order to reduce and eliminate MB uses as soon as possible. It also describes linkages with and implications for the development and deployment of alternatives, which formed an integral and crucial part of the strategy and, more generally, of the EC policy for the complete phase out of methyl bromide for critical uses.

The ECMS addressed all the requirements of Decision Ex.I/4(3) by providing information on procedures or actions that:

- Avoid increases in MB consumption except for unforeseen circumstances;
- Encourage the use of alternatives through the use of expedited procedures to develop, register and deploy technically and economically feasible alternatives to MB;

[1] Methyl bromide used for feedstock, specific laboratory uses and for official quarantine and pre-shipment (QPS) purposes is exempt from this phase-out date.

- Bring forward the time when MB consumption for each use can be reduced and finally phased-out as soon as technically and economically feasible alternatives are available;
- Promote the implementation of measures which ensure that any use and emissions of MB are minimised (in cases where an exemption is authorised).

As a result of the constructive work carried out by national authorities and former MB users, all EC Member States completed the phase-out of critical uses of MB by the end of 2008.

Chapter 1 describes the restrictions on the use of MB contained in the Montreal Protocol and in the EC Regulation on substances that deplete the ozone layer (Regulation (EC) No 2037/2000). Any critical uses require the approval of the Parties to the Montreal Protocol. In addition Articles 3(2) and 4(2) of the EC Regulation required the Commission to determine every year any critical uses for which the production, importation and use of MB may be permitted, in the light of the criteria contained in the relevant Decisions of the Montreal Protocol and the Regulation.

The Member States (MSs) agreed to send their requests for critical uses to the Ozone Secretariat through the European Commission. A first review of the nominations was conducted by the Commission and the MS involved before inclusion in the EC Nomination submitted to the Ozone Secretariat. After the Montreal Protocol Parties made a Decision on the eligible quantities of MB, a separate Commission Decision was published annually, specifying the quantity of MB that could be licensed in the EC for each critical use that met all the necessary criteria.

The Commission Decisions were based on an independent technical assessment of the amount of MB eligible for licensing, assessed according to the criteria contained in the EC Regulation and relevant Decisions of the Montreal Protocol, and agreed following formal consultations with Member States. Stocks of MB were deducted from the quantity of MB agreed for each 'category of use' for each fumigator, in order to minimise the amount of 'new' MB that could be imported or produced. The EC Regulation from 1 January 2006 onwards banned the use of stocks for uses other than critical uses authorised in Commission Decisions.

In the EC, 128 fumigators were licensed 'users' of MB in 2005; this number was reduced to 57 fumigation enterprises eligible to use MB for CUEs in 2007, and 7 in 2008. The transition from MB to alternatives focussed on the adoption of the alternatives by the limited number of fumigators, rather than by thousands of individual farmers and food facilities. The use of alternatives by trained fumigators or pest control operators will ensure comparable economic results as with MB, thereby gaining the confidence of farmers and industry in the alternatives.

Annex 1 contains a list of tables that have been updated annually and Annex 2 the key parts of Decisions agreed in the Montreal Protocol that place conditions to restrict the use of MB as a critical use, and promote its phase out as soon as technically and economically feasible alternatives are available.

Regulation 2037/2000 is currently being revised. Following a vote by the European Parliament on 25 March 2009 and pending endorsement by the European Council, the new regulatory text does not allow the use of MB after 18 March 2010, including for QPS applications, thereby aligning the provisions with EC Directive 91/414/EEC on placing Plant Protection Products on the market, which did not include methyl bromide in the list of authorised active pesticide substances.

Chapter 2 documents the historical trends in MB consumption[2] in the EC by 25 countries that were Member States in 2006; 23 of these countries used MB in the period 1991-2004.[3] In 2006, nine of the 25 Member States[4] were authorised to use MB for critical uses, while fourteen Member States[5] no longer used MB. In 2007, five Member States were authorised to use MB for critical uses[6], while eighteen no longer used MB. In 2008, only two Member States used MB for critical uses[7]. The EC completed the phase-out of all critical uses by the end of 2008. No critical use nominations were submitted by the EC for 2009.

In 2005-2008, the amount of MB licensed by the Commission was less than the amount authorised by the Montreal Protocol because of progress made by the Member States in the implementation of alternatives between the time the Nomination was first submitted to the Protocol, and the time when licensing occurred. For example, EC critical uses authorised by the Protocol for 2005 amounted to 23% (4,393 tonnes) of EC-12 consumption in 1991[8] and 18% (3,536 t) in 2006, but the EC allocated quotas for licensing at 14% (2,777 t)[9] in 2005 and 9% in 2006 (1,654 t before deducting stocks) because more alternatives were found to be available at the licensing stage (Table 2.1). By the end of 2008, the EC-25 Member States completed their phase-out of more than 19,649 of MB.[10]

The total number of critical uses in the EC was reduced from about 90 in 2005/6 to 18 in 2007 and 5 in 2008.[11]

In 2007, 87% of the MB was licensed for use in Spain (252 t) and Italy (203 t), with the remaining 13% apportioned to France (39 t), Poland (27 t) and the Netherlands

2 Quantities cited in this report do not include quarantine and pre-shipment (QPS) uses of MB, feedstock and specific laboratory uses which are currently exempt from phase-out under the Montreal Protocol), but nevertheless all these uses are controlled and monitored under Regulation (EC) No 2037/2000.

3 The only two EC-25 countries that did not report any consumption of MB in the period 1991-2004 were Luxembourg and Estonia. Bulgaria and Romania, which now form part of the EC-27, used MB prior to 2005. This means a total of 25 of the EC-27 countries used MB in past years.

4 Commission Decisions 2006/350/EC and 2007/129/EC authorised 9 Member States to use MB in 2006 for critical uses: Belgium, France, Greece, Ireland, Italy, Poland, Spain, the Netherlands, and the United Kingdom.

5 14 Member States that consumed MB in the past did not have critical uses authorised in 2006: Austria, Cyprus, Czech Republic, Denmark, Finland, Germany, Hungary, Latvia, Lithuania, Malta, Portugal, Slovakia, Sweden, and Slovenia.

6 Commission Decision 2007/386/EC (Official Journal L 143, 6.6.2007, 27-30).

7 Commission Decision 2008/320/EC (Official Journal L 109, 19.4.2008, 32-34)

8 The EC-12's official 1991 base level consumption of methyl bromide for controlled uses was 19,217 tonnes, according to the Ozone Secretariat database on ODS consumption compiled under Article 7 of the Montreal Protocol. In 1991 the EC-25 consumed 19,649 tonnes and the EC-27 consumed 19,735 tonnes MB (Ozone Secretariat data).

9 Commission Decision 2005/625/EC (OJ L 219, 24.8.2005 p.47-53) deducted 207 tonnes of stocks from the total of 2,777 tonnes, so 13% of base level (2,570 tonnes) MB was authorized in the EC, and 2,530 tonnes were finally reported as used by Member States in 2005 (EC Accounting Framework Report). Details in Table 2.1.

10 In 1991 the EC-25 consumption was 19,649 tonnes.

11 Details are provided in Annex 3 Table 3.C.

(0.1 t). Soil fumigation accounted for 96% of the authorised uses, with strawberry runner plants (58%), tomato (15%), cut-flower and bulb production (12%) and peppers (10%) predominating. The fifth major use was for fumigation of mills (3%), which was the principle post-harvest use. As a result of this analysis the ECMS focused on the deployment of alternatives in these five areas which together accounted for 99% of the critical uses of MB in the EC in 2007. In 2008, the authorised critical uses were for strawberry runners (99.7%, 2 MSs), imported coffee beans (0.2%, 1 MS) and research (0.1%, 1 MS).

Annex 3 provides details on 'MB uses trends – historical and current'; this information has been helpful for analysing use categories that needed special attention in order to phase out MB.

The needs of users (pest control operators (PCOs) and fumigators) and end users (e.g. farmers, flour mill managers) are discussed in a section about the transition to MB alternatives. End users require cost-effective methods of pest and disease control that allow them to make a profit by producing a crop of adequate yield and market-acceptable quality. End users producing nursery crops may also need to meet national or export certification standards as these plants are sold to other growers. Mills and food companies need to maintain standards of food hygiene and they must meet customers' requirements by avoiding food contaminated by insects or rodents. End users and PCOs must also meet the increasingly stringent restrictions placed on all pesticide products in the EC.

Soil sector phase-out programmes implemented in Member States have generally provided benefits to growers and led to phasing out of more than 19,000 tonnes of MB since 1991. These led to major technical innovations and agricultural improvements in a number of Member States, which increased grower skills and knowledge of pest and disease control, and ultimately increased crop production.[12]

The phase out of the remaining uses of MB offered opportunities to PCOs to diversify their operations into new methods of pest control and new areas of business, such as consultancy services involving pest monitoring, training courses on how to use alternatives, and the supply of new alternatives and equipment. Many PCOs adopted cost-effective, ozone-safe pest control methods, registered and available in the locality, which they can offer their customers.

Chapter 3 summarises the alternatives available and under development for soil and post-harvest uses in the EC, many of which have been documented since 1994 in reports to the Protocol by UNEP's Technology and Economic Assessment Panel (TEAP) and its specialist Committee, the Methyl Bromide Technical Options Committee (MBTOC). It is acknowledged that most alternatives have to be applied in combination with others because individually they do not have the same technical properties as MB.

[12] For example, analysts have concluded that MB phase-out in the Netherlands benefitted horticulture because it acted as a catalyst for the widespread development and adoption of new and improved production practices (VROM 1997; De Barro 1995).

The main pest control chemicals for soil uses have in the past included combinations of fumigants (such as MB, 1,3-dichloropropene (1,3-D), chloropicrin (PIC), dazomet, metam sodium, metam potassium) and a range of other nematicides, fungicides and herbicides. However MB and other soil fumigants are increasingly subject to restrictions under the EC Directive 91/414 on Plant Protection Products (details in section 4.2). Some alternatives are used in combination with Virtually Impermeable Film (VIF) to improve pest control.

The main non-chemical methods (typically used in combination with another treatment) are crop rotation, grafting on resistant rootstock, resistant varieties, soil steaming, soil-less cultivation, mulches, solarisation, biofumigation and mechanical weeding. Cultural practices such as field sanitation, balanced fertilisation, tillage, irrigation control and planting time are widespread in the EC and help to control pests.

Fundamental to the use of alternatives (and minimisation of fumigation in general) are actions related to (a) pest monitoring, to determine if pests are present at potentially damaging levels, (b) use of effective application methods and (c) use of combinations of treatments or practices where necessary to control the range of pests present. In Belgium, for example, mandatory identification of soil pests reduced the use of MB for critical uses in 2005 by 70%.

Alternatives under development for soil uses include dimethyl disulfide, which is being trialled in France, Italy and Spain; optimised biofumigation techniques, propylene oxide, sodium azide and others in Spain; soil-steaming or hot-air equipment manufactured in the Netherlands and Italy; and additional resistant cultivars for many crops.

The main chemicals for pest control in post-harvest applications include sulfuryl fluoride, phosphine (solid and gaseous formulations, with special practices to avoid corrosion), contact insecticides and acaricides. Future chemical products might include ethyl formate in CO_2 and propylene oxide (already registered in other regions) and EDN (in the registration process in other regions).

The main non-chemical methods for post-harvest disinfestation include heat treatments (most recently ‘spot’ applications), Integrated Pest Management (IPM, including cleaning, inspection, pest monitoring, trapping and selective pesticides), controlled atmospheres, high-pressure + carbon dioxide, vacuum hermetic systems, spot-freezing, mechanical control of insects, and modified atmosphere packaging. Individual alternatives, such as heat, have been used commercially for many years in some Member States, but are under development in others, indicating that procedures to transfer existing technologies between Member States can be further improved in the EC.

The Commission and Member States invested in research programmes that phased out MB directly (one MS, for example, started large-scale specific programmes in 1997), or that phased out MB as part of larger research programmes that aimed to remove chemicals from the food chain and to improve the sustainability of crop production methods. Working with the governments of Member States, and other partners such as UNEP, the Commission has co-hosted five international conferences on MB

alternatives since 1997. More recently, some crop certification organisations and supermarkets have required crops to be grown free of MB as a condition of purchase.

Annex 4 provides information on available and registered alternatives in the EC.

Chapter 4 discusses the rates of adoption of MB alternatives in the EC. The rate of adoption (or its equivalent term 'market penetration') is increased when the supply of MB is reduced and linked to other activities, such as training of PCOs in the use of MB alternatives by agricultural institutes, extension workers and crop production associations; and/or changes in the economic environment that encourage the use of alternatives.

In the Netherlands, Denmark, Italy and Spain, for example, phase-out was supported by national policies or plans that promoted alternatives and minimised the amount of MB authorised. The ECMS provides information on actions taken by Member States to develop economic environments conducive to the phase out of MB and the implementation of alternatives. For example, Slovakia placed a tax on MB to discourage use and generate funds for ozone layer protection. Italy, Spain, the Netherlands and the UK have used government grants or bank loans to assist the adoption of alternative technologies. The Member States have shown commitment to its phase out through research programmes and annual reductions according to the availability of the alternatives. Supermarket chains and international certification programmes that prohibit the use of MB have also encouraged farmers to adopt MB alternatives.

The registration of additional chemical alternatives would increase the range of options available to users, although the cost and complexity of registration has often deterred manufacturers from making applications and this presents a barrier particularly in Member States where the potential market for new chemical products would be small. However, the time needed for authorisation of low-toxicity pesticides is generally shorter than traditional chemical pesticides. MB and a number of other substances in the EC have not been included in the list of authorised active substances (pesticides) following a review of manufacturers' submissions of toxicological information, on the basis of the criteria in Directives 91/414/EEC concerning the placing of plant protection products on the market and 98/8/EC concerning the placing of biocidal products on the market.

The ECMS provides examples of technically feasible adoption rates found in various crops and countries. For example, MB was eliminated at the rate of up to 2090 ha per year in strawberry fruit production by the adoption of alternative fumigants. Production of the same crop on substrates, however, produced only a rate of adoption up to 80 ha per year, mainly due to increased costs, even though yields also increased. Chapter 4 provides examples of the rates of change that have occurred in other crops.[13]

Currently, a major chemical replacement for the post-harvest uses of MB is sulfuryl fluoride (SF). Adoption has been promoted by registration and the licensing of PCOs

[13] Table 4.3 provides a summary of feasible rates of adoption, while Annex Table 7.A provides detailed examples.

that pass a training programme designed to ensure its proper use. In Belgium, France, Germany, Hungary, Ireland, Italy and the UK this product is registered for mills and food structures; and the company that supplies this product has put in place programmes for training of fumigators in the application of SF. Experience in the use of SF as a result of trials and adoption in different types of food facilities provided data on feasible annual rates of MB elimination in this sector.

Training programmes are another element in the promotion and adoption of alternatives and have been undertaken by government agencies and individual companies, growers associations and others.

Annex 5 outlines the EC registration procedures for pesticides. Annex 6 contains the current registration status of chemical and non-chemical alternatives in the EC. Annex 7 provides more detailed data on the historical rate of adoption of alternatives.

Chapter 5 describes the "Decision Tree" which was used to determine whether or not all or part of a proposed use of MB was considered critical. The Decision Tree is based on the criteria contained in Decision IX/6, other relevant Decisions and the EC Regulation. The chapter also outlines the guiding principles developed in the ECMS, and the definitions of terms used in the Decision Tree.

In cases where a critical use of MB was authorised, the steps to minimise use and emissions were provided. In the soil sector these steps include:

- Limiting the frequency of MB use;
- Allowing use of MB only when pest monitoring shows that alternatives would not provide adequate pest and disease control, as far as appropriate;
- Ensuring permits are issued before each fumigation;
- Reducing the dose of MB in cases where it is higher than technically necessary, and by combining MB with alternatives;
- Changing from hot gas to injection methods.

Steps to minimise use and emissions in the post-harvest sector include:

- Improving the gas tightness of premises;
- Continuous monitoring to avoid over-dosing;
- Increasing the temperature and time where possible;
- Using forced-air circulation to improve efficacy at lower MB doses;
- Using equipment to capture MB at the end of the fumigation period where feasible.

Actions taken to eliminate the use of MB for critical uses included focussed efforts on the resources (equipment, training) required to implement alternatives, encouragement of implementation efforts, and research to expand the range of alternatives available to users. Other actions included making stakeholders aware of alternatives and the need for immediate adoption, promoting awareness by case studies on the cost and use of alternatives for the critical uses of MB, and the promotion of websites to encourage the exchange of alternative technologies between Member States.

Chapter 6 summarises the compliance of the EC with decisions of the Montreal Protocol on critical uses of MB. The EC put in place review procedures that have

been successful in reducing and eliminating a large quantity of MB and a large number of critical uses-categories.

Each year, the EC has submitted updated information to the Parties on alternatives for pre- and post-harvest uses of MB; annual Accounting Framework Reports that include information on the amounts approved, authorised, licensed and used, and stocks; a description of the licensing procedures that ensured that the amount of MB placed on the market did not exceed the amount authorised for each category of use in each Member State; and a summary of each EC Nomination.

The procedures and forms used to examine requests for critical uses are summarised in Annex 8. Annex 9 contains a list of key citations for the ECMS.

Conclusions

The use of MB in about 90 critical uses has been phased out in the EC.
The ECMS demonstrates the work done by the European Community and its Member States and their full commitment to fulfil their obligations under the Montreal Protocol, in particular to eliminate MB for critical uses as soon as possible.
The phase-out of critical uses was achieved by combined and convergent efforts both at Community and national level through the implementation of the Regulation on Ozone Depleting Substances (Regulation (EC) No 2037/2000) and through the provision of programmes and activities that encouraged the adoption of existing alternatives. The development of additional alternatives is actively encouraged, in order to provide further pest control options for users.

1 Phasing out critical uses of methyl bromide

The Montreal Protocol on "Substances that Deplete the Ozone Layer" was agreed in 1987 and aims to phase out all substances that deplete the earth's ozone layer. The Protocol has been signed by 193 countries and is widely regarded as the most effective international environmental agreement to date.

In the European Community, Regulation (EC) No 2037/2000 gives effect to agreements of the Parties to the Montreal Protocol. The scheduled phase-out date for methyl bromide (MB) in this Regulation was 31 December 2004. Exemptions for so-called 'critical use exemptions' (CUEs) have been permitted under specific circumstances described below.

The Montreal Protocol has required Parties in the past to submit strategies as a way to promote the phase out of particular types of ODS. In 1998 the EC produced "The European Community Strategy for the Phase Out of CFCs in Metered-Dose Inhalers"[14]. In July 2000, in response to Montreal Protocol Decision X/7, the EC submitted "The European Community Strategy for the Management and Phase Out of Halons". These strategies provided direction and guidance on the range of options available to reduce and eliminate the use and emissions of CFCs and halon. In the CFC phase out strategy, the strategy also defined the conditions for determining when CFCs should be considered as no longer essential.

This chapter describes the requirement for Parties that have nominated CUEs to produce and update a "Management Strategy for the Phase-out of Critical Uses of Methyl Bromide". It lists the required contents of such a Strategy. It also describes relevant decisions of the Parties that placed conditions on critical uses and must be considered in the Strategy.

1.1 Restrictions on methyl bromide in the Montreal Protocol

In 1992, MB was listed as a controlled ozone depleting substance under the Montreal Protocol. Article 2H of the Protocol established a timetable of reductions in the

[14] Official Journal C 355, 20.11.98, 2-30

production and consumption of MB, and most uses were due to be phased out by 1 January 2005 in industrialised countries. Temporary exemptions from the phase-out date, called "Critical Use Exemptions" (CUEs), are permitted in certain cases when technically and economically feasible alternatives to MB are not available or cannot be used. Decision Ex.I/4 states that *"each Party should aim to significantly and progressively decrease its production and consumption of methyl bromide for critical uses with the intention of completely phasing out methyl bromide as soon as technically and economically feasible alternatives are available."*

1.2 Requirement to submit a Strategy: Decision Ex.I/4

Paragraph 3 of Decision Ex.I/4 of the Montreal Protocol requests Parties that submit critical use nominations after 2005 to develop and submit to the Ozone Secretariat, before 1 February 2006, a Management Strategy for the Phase-out of Critical Uses of Methyl Bromide. The Strategy should 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;*

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."*

Recently, MoP Decision XIX/9(12) stated that parties should continue to ensure that management strategies address the aims specified in Decision Ex.I/4(3). Decision XX/5(12) also stated that:

> *"each Party should continue to ensure that its national management strategy for the phase-out of critical uses of methyl bromide addresses the aims specified in paragraph 3 of Decision Ex.I/4, and that each Party should periodically update or provide supplements to its national management strategy to provide new information on actions, such as identifying alternatives or regulatory updates, being undertaken to make significant progress in reducing critical use nominations, and indicating currently envisaged progress towards a phasedown."*

1.3 Restrictions on methyl bromide in the EC Regulations

In the European Community, ozone depleting substances are currently controlled by Regulation (EC) No. 2037/2000 on "Substances that Deplete the Ozone Layer". This Regulation covers the production, import, export, placing on the market, use and destruction of ozone depleting substances, including MB.

The EC Regulation required the phase out of MB production and importation by 31 December 2004, with the exception of MB used for industrial feedstock, for quarantine and pre-shipment (QPS) purposes, for laboratory uses, for 'inward processing relief'[15] and for critical uses. The European Commission is permitted to licence production and importation of MB for CUEs only in cases that comply with the Montreal Protocol and the EC Regulation.

Regulation 2037/2000 is currently being revised, and it is expected that a new Regulation will come into force on 1 January 2010. Following a vote by the European Parliament on 25 March 2009 (European Parliament 2009), and pending endorsement by the European Council, the new regulatory text does not allow the use of MB after 18 March 2010, including QPS applications, thereby aligning the provisions with EC Directive 91/414/EEC on placing Plant Protection Products[16] on the market, under which methyl bromide was not included in the list of authorised active pesticide substances.

1.4 Criteria for determining Critical Uses: Decision IX/6 and other relevant Decisions

This section outlines the legal provisions that applied to the CUEs authorised in the EC in the period 2005-2008, under Regulation (EC) No 2037/2000.

1.4.1 Criteria in Regulation (EC) No 2037/2000

Article 3(2)(ii) of Regulation (EC) No 2037/2000 allowed CUEs to be authorised on the following basis (underlined text is discussed in sections 1.4.1 – 1.4.7 below):

> *"In the light of the proposals made by Member States, the Commission shall, in accordance with the procedure referred to in Article 18(2), apply the criteria set out in Decision IX/6 of the Parties, together with any other relevant criteria agreed by the Parties, in order to determine every year any critical uses for which the production, importation and use of methyl bromide may be permitted in the Community after 31 December 2004, the quantities and uses to be permitted and those users who may take advantage of the critical exemption. Such production and importation shall be allowed only if no adequate alternatives or recycled or reclaimed methyl bromide is available from any of the Parties."*

Article 4(2)(i) of Regulation (EC) No 2037/2000 states:

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[15] Methyl bromide that is imported, processed and repacked, and re-exported following strictly-controlled procedures

[16] Commission Decision 2008/753/EC on the Non-Inclusion of Methyl Bromide in Annex I to Council Directive 91/414/EEC requires the withdrawal of all authorisations for plant protection products (pesticides) that contain methyl bromide by 18 March 2009 (Official Journal L 258, 26.9.2008, 68-69). All pesticide uses of MB (including for QPS) will be banned by 18 March 2010.

"Subject to paragraphs 4 and 5, each producer and importer shall ensure that: …

(d) it does not place any methyl bromide on the market or use any for its own account after 31 December 2004.

To the extent permitted by the Protocol, the Commission shall, following a request by a competent authority of a Member State and in accordance with the procedure referred to in Article 18(2), adjust the calculated level of methyl bromide referred to in Article 3(2)(i)(c) and subparagraph (c) where it is demonstrated that this is necessary to meet the needs of that Member State, because technically and economically feasible alternatives or substitutes that are acceptable from the standpoint of environment and health are not available or cannot be used.

The Commission, in consultation with Member States, shall encourage the development, including research, and the use of alternatives to methyl bromide as soon as possible."

As described in section 1.3, these exemption clauses are expected to be removed in the new EC Regulation on ODS, pending adoption by Parliament and Council.

1.4.2 Article 18(2) Management Committee Procedure

Article 18(2) of Regulation (EC) No 2037/2000 refers to the Management Committee which assists with the implementation of the Regulation and meets annually on at least two occasions. This Committee is composed of representatives from all Member States (typically from Environment ministries or departments) and is chaired by the Commission.

In relation to the critical uses of MB, the Commission sought the opinion of the Management Committee on proposed Commission decisions for the allocation/licensing of limited quantities of MB for specific uses, based on the list of critical uses approved by the Parties[17], and on a technical analysis of the requests from Member States. Once voted by the Management Committee (by qualified majority), the decision was then adopted by the Commission and published in the Official Journal of the European Union.

1.4.3 Decision IX/6 of the Montreal Protocol

Decision IX/6 of the Montreal Protocol entitled "Critical-use exemptions for methyl bromide" decided the following:

1. To apply the following criteria and procedure in assessing a critical methyl bromide use for the purposes of control measures in Article 2 of the Protocol:

(a) That a use of methyl bromide should qualify as "critical" only if the nominating Party determines that:

[17] A separate committee, the National Experts Committee, was involved in reviewing the proposed EC Nominations to UNEP for quantities of MB that had been agreed with the relevant MSs.

(i) The specific use is critical because the lack of availability of methyl bromide for that use would result in a significant market disruption; and

(ii) There are no technically and economically feasible alternatives or substitutes available to the user that are acceptable from the standpoint of environment and health and are suitable to the crops and circumstances of the nomination;

(b) That production and consumption, if any, of methyl bromide for critical uses should be permitted only if:

(i) All technically and economically feasible steps have been taken to minimize the critical use and any associated emission of methyl bromide;

(ii) Methyl bromide is not available in sufficient quantity and quality from existing stocks of banked or recycled methyl bromide, also bearing in mind the developing countries' need for methyl bromide;

(iii) It is demonstrated that an appropriate effort is being made to evaluate, commercialize and secure national regulatory approval of alternatives and substitutes, taking into consideration the circumstances of the particular nomination and the special needs of Article 5 Parties, including lack of financial and expert resources, institutional capacity, and information. Non-Article 5 Parties must demonstrate that research programmes are in place to develop and deploy alternatives and substitutes. […]

2. To request the Technology and Economic Assessment Panel to review nominations and make recommendations based on the criteria established in paragraphs 1 (a) (ii) and 1 (b) of the present decision;

The procedures for implementing Decision IX/6 in the Montreal Protocol and EC are described in Chapter 5.

1.4.4 Other relevant criteria agreed by the Parties

The Parties to the Protocol have recognized that critical use exemptions "*are intended to be limited, temporary derogations from the phase-out of methyl bromide*" (Decision Ex.I/3) and that "*each Party should aim at significantly and progressively decreasing its production and consumption of methyl bromide for critical uses with the intention of completely phasing out methyl bromide as soon as technically and economically feasible alternatives are available*" (Decision Ex.I/4).

Decision XVI/4[18] invites Parties to provide in their nominations information on their determination of significant market disruption. Member States therefore provided evidence to the Commission to support their view that the specific use was critical because the lack of availability of methyl bromide for that use would result in a

[18] Paragraph 21 of Annex I to the Report of the 16th Meeting of the Parties, as referenced by Decision XVI/4.

significant market disruption. The term "significant market disruption" and other relevant terms have been defined in Chapter 5.

Paragraph 6 of Decision Ex.I/4 requests that any applications for critical uses of methyl bromide after 2004 contain a description of the methodology used to determine economic feasibility, in the event that economic feasibility is used as the criterion to justify the critical use, and to use as a guide the economic criteria contained in Part B, Section 4 of Annex 1 to the Report of the First Extraordinary Meeting of the Parties[19].

Decision XVI/4 refers to Annex 1[20] of the Report of the 16th Meeting of the Parties which in turn states that a nominating Party should inform MBTOC when registration of an alternative to methyl bromide occurs. Each Member State therefore provided information to the Commission on the registration status of an alternative, such as the date when registration was expected, because MBTOC was required to take this into account when recommending to the Parties a quantity of methyl bromide for critical uses.

Decision XVI/4 refers to Annex 1[21] of the Report of the 16th Meeting of the Parties which in turn states that where MBTOC recommends a nomination on the grounds that it is necessary to have a period of time for the adoption of alternatives, the basis for calculating the time period must be explained fully in the TEAP report. To enable TEAP to provide this kind of analysis, each Member State, supplier, distributor or manufacturer provided information to the Commission on the relevant factors that could be used to calculate the time for the adoption of alternatives, including the number of fumigation and pest control companies that needed to transition, the estimated training time assuming full effort, opportunities for importing alternative equipment and expertise if not available locally, and the costs involved.

Decision Ex.I/3(7) notes that a Party may request reconsideration of a CUE in the case of exceptional circumstances, such as unforeseen deregistration of an approved alternative when no other feasible alternatives are available or where a pest or pathogen builds resistance to the alternative, or where the use-reduction measures on which TEAP based its recommendation as to the level necessary to satisfy a critical-use are demonstrated not to be feasible in the specific circumstances of that Party.

By having the above evidence for each crop or post-harvest use from each Member State making a submission for critical uses, the European Community as the nominating Party was able to assess compliance with the relevant criteria in Decision IX/6 and other criteria that have been agreed by the Parties in more recent decisions.

Each Member State was required to provide to the Commission a critical use nomination application form (as required in the TEAP/MBTOC Handbook of CUEs) and a summary of each crop or post-harvest nomination containing the following information: (a) Name of the Member State; (b) Descriptive title of the application; (c) Crop name (open field or protected) or post-harvest use; (d) Quantity of methyl bromide requested; and (e) Reasons why alternatives to methyl bromide were not technically and economically feasible. The summaries allowed the Commission as the

[19] UNEP/OzL.Pro.ExMP/1/3.

[20] Paragraph 26 of Annex I to the Report of the 16th Meeting of the Parties, as referenced by Decision XVI/4.

[21] Paragraph 35 of Annex I to the Report of the 16th Meeting of the Parties, as referenced by Decision XVI/4.

nominating Party to supply this information to the Ozone Secretariat, pursuant to Decision Ex.I/4(7).

1.4.5 Quantities and uses

In Article 3(2) of Regulation (EC) No 2037/2000, the 'quantities' of MB refer to the kilograms of MB approved or licensed for each 'category of use' as referred to in a Decision of the Parties or Commission Decision. These quantities were decided annually. A category of use (also called 'use category') could be for 'Carrot production' in France for example, or 'Flour mills' in Italy. In the first years of critical uses in 2005/6 about 90 categories of use were authorised by MoP. After further review at EC level, 79 categories of use were authorised in 10 Member States in 2005, and this was reduced to 46 categories in 9 Member States in 2006[22] due to the availability and adoption of alternatives. In 2007, 18 categories of use were authorised in 5 Member States, while in 2008 the number was reduced to 5 categories in 2 Member States.

1.4.6 Methyl bromide stocks

Stocks are MB "*…that has not been put to its intended use in the year in which it was produced or imported…*'[23], thereby remaining in hand with the potential to be used at a future time, avoiding the production of 'fresh' MB.

The use of stocks for CUEs is required under paragraph 1(b)(ii) of Decision IX/6 which "*…permits production and consumption, if any, of methyl bromide for critical uses only if methyl bromide is not available in sufficient quantity and quality from existing stocks of banked or recycled methyl bromide…*". Decision Ex.II/1(3) also emphasises the need for Parties to take account of stocks and states "*That each party which has an agreed critical use shall take into full consideration all quantities of existing stocks of methyl bromide…*". The Accounting Framework Report for CUEs required by the Montreal Protocol identifies the quantities of MB *"in hand"* at the beginning and end of each year (Decision XVI/6, details in Annex 2 and Annex 3 Table 3.B).

In each year for which CUEs were authorised, the Commission compiled data on the stocks of MB known to be available for critical uses in the Community, as notified to the Commission by the Member States. The MB stocks were deducted from each critical use category prior to a quota allocation being authorised for the importation of MB for that particular use. When CUEs were authorised for 2005, for example, 207 tonnes of stocks were deducted from the total quantity that could be imported or produced.

From 1 January 2006, Regulation (EC) No 2037/2000 permitted stocks of methyl bromide to be used only for critical uses listed in the Commission Decisions on CUEs. Methyl bromide produced or imported or in stock for QPS, for feedstock and

[22] A list of the use-categories authorised as CUEs in 2005-2008 is provided in Annex Table 3.C.

[23] Note by the Ozone Secretariat presented to the Parties entitled *'The issue of ODS stockpiling relative to non-compliance with the Montreal Protocol'*. UNEP OzL.Pro.27/CRP3/Add 1, 10 December 2005.

for laboratory uses in the EC can only be used for these specific purposes. MB stocks cannot be used for any other purpose.[24]

Another potential source of MB is from '*recycled or reclaimed*' MB. However, unlike other ODS, in practice MB used in CUEs has rarely been captured and recycled. For example, halons (once used extensively for fire fighting and explosion suppression) can be removed from existing equipment and then cleaned to '*reclaim*' them before they could be '*recycled*' for uses that are still permitted. MB is vaporised into the soil or into a food facility where it is retained for a period of several hours to several days in order to kill pests before the gas is released to the atmosphere. In the EC there are several exceptions related to QPS uses. A facility used for disinfestation of coffee and cocoa beans in the seaport area of Szczecin in Poland has equipment to capture and re-use MB. Belgium has required the recapture of MB following QPS fumigations since 1 July 2007 (Fytoweb 2007), and the Port of Hamburg in Germany made the recapture of MB compulsory from 1 September 2008 [reference to follow].

1.4.7 Users who may take advantage of the critical exemption

Article 17(2) of Regulation (EC) No 2037/2000 required Member States to define the minimum qualification requirements for personnel involved in the application of methyl bromide and, since fumigation has been the only use, the Commission determined that fumigators qualified to apply methyl bromide were deemed to be the only 'users'. Fumigators were officially notified to the Commission by the Member State and authorised by the Commission to request an importer or producer to supply methyl bromide for critical uses.

MB fumigators have been trained in the application of MB, unlike most farmers or mill owners that generally are not qualified to apply methyl bromide but who own properties on which it has been applied. Member States put in place procedures to identify the MB fumigators within their territory that were permitted to use methyl bromide for critical uses. Furthermore, some Member States, such as Poland and Italy, required that in order to be eligible for taking advantage of the Commission licence for CUEs, the fumigators or fumigation companies were obliged to present reports showing details of MB use for critical applications in the previous year, as well as the detailed plans for use in the year for which a CUE was requested.

As fumigators and fumigation companies were the only users of MB, it followed that the transition to alternatives would be accomplished by focusing on the adoption of alternatives by relatively few personnel and companies, rather than reaching out to thousands of farmers and operators of food processing facilities. In the EC, 128 fumigators / fumigation companies were registered to use MB for critical uses in 2005[25], and this number was reduced to 7 fumigators/fumigation companies in only 2 Member States in 2008. Further information on fumigators is supplied in Table 2.4.

[24] This means MB-CUE stocks were not permitted to be used for non-critical uses in the EC up to 2008. The last remaining stocks after the phase out at the end of 2008 were allowed to be used for QPS applications if the transfer was fully documented and transparent.

[25] in 10 Member States.

2 Methyl bromide uses – historical trends

2.1 Historical methyl bromide consumption trends

All data in this chapter refers to soil and post harvest (non-QPS) uses of MB, therefore the reported data do not include QPS or feedstock. MB production in the EC was about 4,195 tonnes in 1991, and was reduced to 1,857 tonnes in 2004. This included MB production for export to developing countries, which was limited to 479 tonnes per year (Ozone Secretariat 2005). The last year of production of MB in the EC was 2005. Historically, the majority of MB has been imported into the EC.

The MB consumption of 12 Member States (EC-12) in 1991 is considered to be the official EC Baseline or Base Level according to the Ozone Secretariat ODS consumption database compiled under Article 7 of the Montreal Protocol. The European Community's consumption in 1991 is therefore commonly reported as 19,217 metric tonnes of MB for soil and post-harvest uses (excluding QPS), which represented about 30% of global consumption. However, the total consumption in 1991 of the EC-25 and EC-27 was 19,649 and 19,735 tonnes respectively. Figure 2.1 shows the historical trend in MB consumption in the European Community for non-QPS purposes.

Since the official EC phase-out date of 31 December 2004, the production, import and export of MB has been limited by Regulation (EC) No 2037/2000 to the specific quantities shown in Table 2.1. The EC 'consumption' (as defined by the Montreal Protocol) was steadily reduced over time to about 1,410 tonnes in 2006, 354 tonnes in 2007 and 0 tonnes in 2009 (for critical uses only, that is, excluding QPS, feedstock and laboratory uses). This represented 7%, 2% and 0%, respectively, of the Ozone Secretariat's EC-12 Baseline consumption in 1991 (Table 2.1).

Figure 2.1 Methyl bromide consumption trends in the European Community compared to the Montreal Protocol schedule, 1991-2009 (tonnes, excluding QPS)

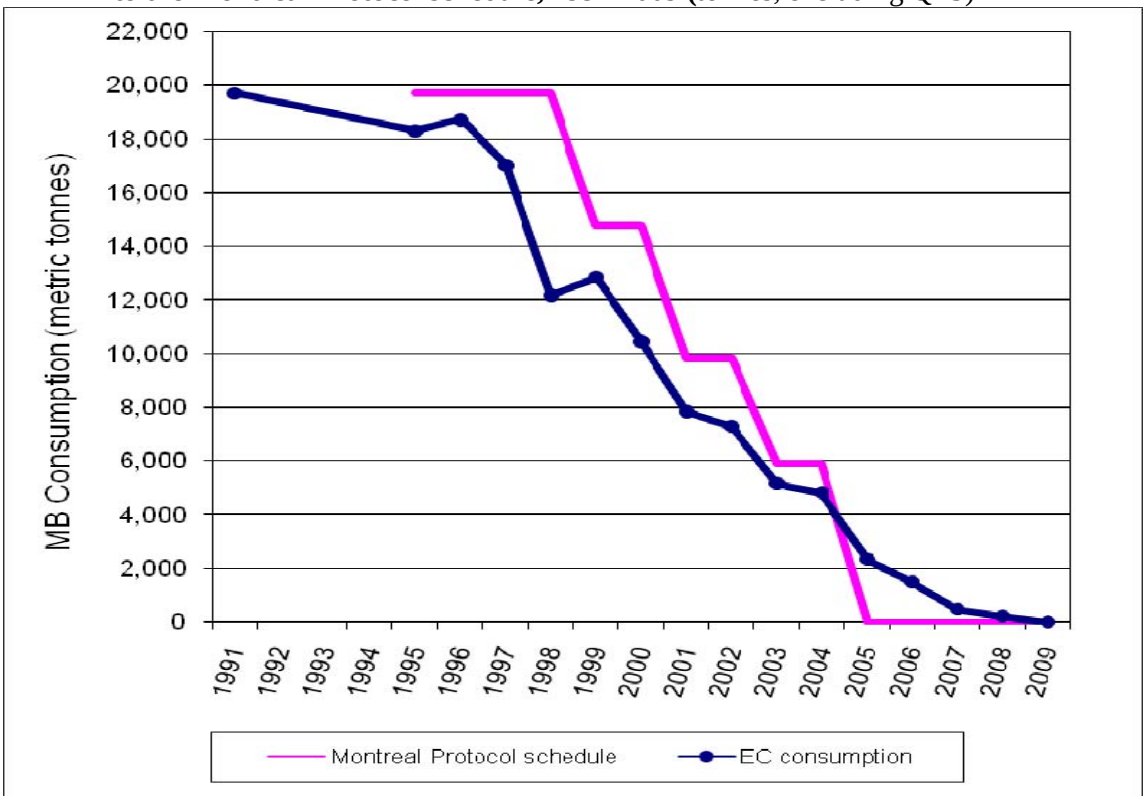


Table 2.2 shows the historical consumption of MB in EC-25 Member States for which data are available.[26] In the 1970s, the Netherlands used a substantial amount of MB (approx. 3,000 tonnes), but phased out the majority of MB (all soil sector uses) by 1992 (MBTOC 2002) because of water contamination, local air contamination, accidents among agricultural workers, and residues in food (Parliamentary Session 1981). Germany did not adopt MB to a great extent, largely due to national policies to prevent water contamination and limit pesticide residues (Ketzis 1992). Denmark phased out MB by 1998 as a result of national regulations for ozone layer protection (MBTOC 2002) and in the same year Sweden phased out MB as well. By 1990, Italy became the major MB consumer in Europe, followed by Spain and France. In the 1980s and 1990s MB consumption declined in some parts of the EC while increasing substantially in others. Nevertheless, the progress in MB phase-out is clear in these countries because MB use was reduced to about 508 tonnes in 2007 in the EC (Table 2.2), eliminating 97% of the historical MB consumption. Consumption in 2008 was reduced to less than 213 tonnes, eliminating 99% of historical consumption. MB consumption in 2009 will be zero in the EC.

[26] Bulgaria and Romania, which now form part of the EC-27, consumed MB since 1991 and phased it out by 2005. Romania was also a MB producer. Both countries developed and implemented effective national strategies and programmes which enabled them to achieve the Montreal Protocol's scheduled phase-out deadline. Bulgaria and Romania did not submit any requests for critical use exemptions.

Table 2.1 Methyl bromide critical uses – quantity nominated, approved, licensed and used in the European Community, 2005-2008

Authorisation Step	2005		2006		2007		2008	
	Tonnes	% [(a)]	Tonnes	% [(a)]	Tonnes	% [(a)]	Tonnes	% [(a)]
Nominated to the Parties of the Montreal Protocol [27]	5,754	29.9	4,213	21.9	1,240	6.5	245	1.3
Approved by the Parties to the Montreal Protocol [28]	4,393	22.8	3,536	18.4	689	3.6	245	1.3
Allocation of quotas, as stated in EC Decisions [29]	2,777	14.4	1,654	8.6	522	2.7	213	1.1
Allocation of quotas after deducting stocks, as stated in EC Decisions [28]	2,570	13.3	1,510	7.8	459	2.4	206	1.1
Used in the European Community, as reported by Member States [30]	2,530	13.2	1,559	8.1	508	2.6	212	1.1

(a) Percentage of 19,217 tonnes, the EC-12 Baseline stated in Ozone Secretariat ODS consumption database compiled under Article 7 of the Montreal Protocol. (The 1991 consumption of the EC-25 totalled 19,649 tonnes, while the EC-27 total was 19,735 tonnes.)

2.2 Past and current uses in the European Community

In the soil sector, MB has been used as a soil treatment to control nematodes, soil-borne fungi and weeds before planting certain crops such as tomato, strawberry, peppers and cut flowers, nursery plants and strawberry runners. In the post-harvest sector, MB has been used to control insects and sometimes rodents in mills, food processing buildings and post-harvest commodities such as rice, nuts, coffee beans, dried fruit and spices.

Figure 2.2 shows the relative change in the quantity of MB used in the EC for major crops/uses in 1991 compared to 2006. Tomato, strawberry, and pepper were the major crops, although many other crops also used MB.

[27] Total quantity nominated, as reported in TEAP (2008) Evaluations of 2008 CUNs for MB and Related Matters, October 2008, p.10.

[28] CUEs authorised by Montreal Protocol Decisions on CUEs (Decision Ex.I/3, XVI/2, XVII/9, XVIII/13, XIX/9).

[29] CUEs authorised in Commission Decisions published in the Official Journal of the European Union (Commission Decisions 2005/625/EC, 2006/350/EC, 2007/129/EC, 2007/386/EC, 2008/320/EC).

[30] Quantity of MB used for CUEs, as reported by Member States in EC Accounting Framework Reports submitted to the Ozone Secretariat in 2006, 2007 and 2008.

Table 2.2 Methyl bromide use trends in Member States for which data are available (tonnes). Table excludes QPS and feedstock.

Country	Before 1980	1991 (estimated)	1993/4 (estimated)	2000 (estimated)	2007 used [31]	2008 used [32]
Belgium		300	400	102	0	0
Denmark		33	33	0	0	0
France		4,195	1,604	815	37	0
Germany[33]		[83]	73	58	0	0
Greece		970	950	750	0	0
Hungary		53	53	40	0	0
Ireland		60			0	0
Italy		6,974	7,000	5,800	199	0
Netherlands	3,000	59	39 [34]	[30]	0.1	0
Poland		200	103	65	27	12
Spain		4,236	4,191	2,377	245	200
Sweden		27	[18]		0	0
UK		629	550	344	0	0
Other EC-25 Member States		1,830	>3,040	797	0	0
Total EC-25 [35]	**No data**	**19,649**	**>18,054**	**11,178**	**508**	**212**

Table 2.3 also compares the major MB uses in the EC in the past (1991) and in recent years (2005 and 2008). Historical information is available primarily for the soil sector. The number of crops using MB fumigation in the soil sector was reduced from more than 40 crops in the 1990s, to 6 crops in 2007, 1 crop (strawberry runners) in 2008, and 0 in 2009. MB has been used primarily in intensive cultivation and high-value cropping systems. In the EC, MB uses that have been phased-out in the soil sector include eggplant, melon, cucumber, strawberry fruit, strawberry runners, tomato, peppers, cut flowers, orchards, vineyards, lettuce, potato, citrus, tobacco, mushrooms, potting soil, tree nurseries, many types of nursery crops and other miscellaneous crops (a comprehensive list is provided in the footnote under Figure 2.2 and further examples can be found in Annex 3, Table 3.E).

In 1991, tomato and strawberry fruit were the major uses, accounting for an estimated 44% of EC MB use in more than 12 MSs. By 2007, MB use for strawberry fruit was

31 Quantity of MB used, as reported by Member States for EC Accounting Framework Report submitted to the Ozone Secretariat in 2008

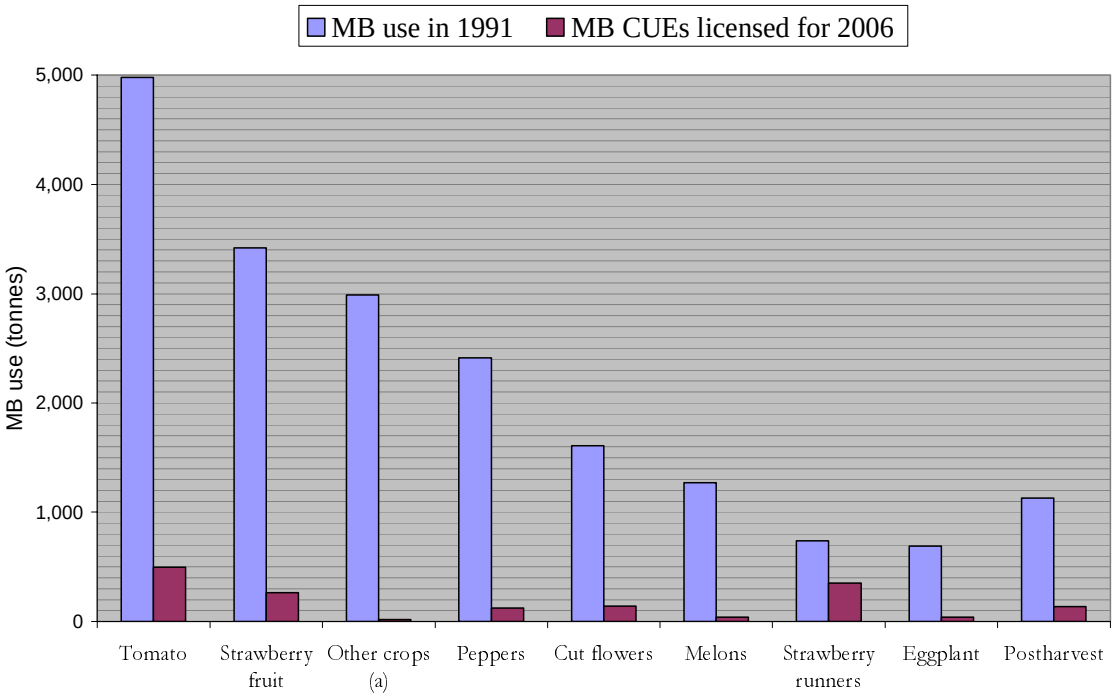
32 Quantity of MB used, as reported by Member States for EC Accounting Framework Report for 2008

33 For the fumigation of mills, structures and commodities only. All MB soil fumigation was phased out in Germany in the 1980s

34 For postharvest uses only. All MB soil fumigation was phased out in the Netherlands by 1992.

35 To allow comparison with earlier years, this table is confined to 25 Member States, although there were 27 Member States from 2007 when Bulgaria and Romania joined the EC. Bulgaria and Romania consumed MB in the past and phased it out by 2005 (as reported in the official Ozone Secretariat database on ODS consumption).

Figure 2.2: Major MB uses in the EC in 1991 and 2006



Note (a): 'Other crops' includes aromatic plants, artichoke, asparagus, basil, beans, carrot, celery, chicory, citrus replant, courgette (zucchini), cucumber, endive, forest tree nurseries, fruit tree nurseries and replant, herbs, lettuce, mushroom, nut trees, onion, ornamental trees, potato, pot plants, potting soil, radish, raspberry, seedbeds, substrate disinfestation, tobacco, vineyard replant, and other fruit and vegetable crops, and other nursery crops.

phased out, except for a nominal research provision for Spain. In 2007, tomato accounted for about 15% of EC CUEs (in 1 MS). Table 2.3 shows the trends by crop/use in 1991 and recently, and illustrates the substantial progress that MSs have accomplished in phasing out MB to date.

In 2005/6 there were about 90 CUE use-categories in 10 Member States, and in 2007 this was reduced to 18 use-categories in 5 Member States, due to the availability and adoption of alternatives (refer to Annex 3). In 2008, there were only 5 use-categories in 2 Member States. In 2008, 25 of the 27 Member States[36] were not authorised to use MB for CUEs.[37] The soil sector accounted for 96% of the CUEs licensed in 2007 (mainly strawberry runners, tomato, cut flowers, pepper). In 2008, the soil sector accounted for 99% of the CUEs, primarily for strawberry runners, with small amounts authorised for research (Table 2.3, details in Annex 3).

36 Including Bulgaria and Romania who acceded the EC on 1 January 2007

37 The following 25 EC Member States were not authorised to use MB for critical uses in 2008: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Romania, Slovakia, Sweden, Slovenia and UK.

Table 2.3 Comparison of major methyl bromide uses in European Community in 1991, 2005 and 2008

MB Use Category	1991 (estimates)			2005 (authorised CUEs)[38]			2008 (authorised CUEs)		
	MB tonnes	MB %	No. Member States	MB tonnes	MB %	No. Member States	MB tonnes	MB %	No. Member States
Crop production									
Tomato	4,980	26%	>12	734	29%	4 (BL, EL, FR, IT)	0	0	0
Strawberry fruit	3,420	18%	>12	497	20%	4 (ES, FR, IT, UK)	0	0	0
Peppers	2,410	13%	>12	251	10%	3 (BL, ES, IT)	0	0	0
Cut flowers	1,610	8%	13	259	10%	6 (BL, EL, ES, FR, IT, PT)	0	0	0
Melons, cucurbits	1,270	7%	7	158	6%	4 (BL, EL, FR, IT)	0	0	0
Eggplant	690	4%	10	98	4%	3 (BL, FR, IT)	0	0	0
Other crops	2,050	10%	14	48	1%	3 (BL, FR, UK)	0	0	0
Research							0.2	0.1	1 (ES)
Sub-total	**16,430**	**85%**	**14**	**2,045**	**80%**	**7**	0.2	**0.1**	**1**
Nursery									
Strawberry runners	740	4%	5	346	14%	5 (BL, ES, FR, IT, PL)	212	99%	2 (ES, PL)
Other nursery	940	5%	10	9	0.3%.	3 (BL, FR, UK)	0	0	0
Sub-total	**1,680**	**9%**	**11**	**355**	**14%**	**6**	**212**	**99%**	**2**
Post-harvest									
Mills, food structures	640	3%	15	151	6%	6 (BL, DE, EL, FR, IT, UK)	0	0	0
Commodities, others	490	3%	16	18	0.7%	7 (BL, EL, FR, IT, NL, PL, UK)	0.4	0.2%	1 (PL)
Sub-total	**1130**	**6%**	**18**	**169**	**7%**	**8**	0.4	0.2%	1
TOTAL	**>19,253**	**100%**	**22**	**2,530**	**100 %**	**10**	**213**	**100%**	**2**

38 Details are provided in Annex Table 3.C.

2.3 Methyl bromide users and pest control operators

In the EC licensing system, MB fumigators were considered to be the MB 'users' (see section 1.4.7). MB fumigators provided a contracted service to growers or food companies, supplying MB gas and carrying out the fumigations on behalf of end-users. In 2005 there were 128 registered[39] fumigation enterprises eligible to use MB for CUEs in 10 Member States of the EC, while in 2007 this was reduced to 57 registered MB fumigation enterprises in 5 Member States. In 2008 this was further reduced to 7 registered fumigators/fumigation enterprises in 2 Member States. As more alternatives have become available, the number of fumigators authorised by the Member States to use MB for critical uses has been reduced (Table 2.4).

Table 2.4 Number of fumigators authorised by Member States to use methyl bromide for CUEs in 2005, 2007 and 2008

Use Category	2005		2007		2008	
	Member States	Fumigators	Member States	Fumigators	Member States	Fumigators
Crop production						
Tomato	4	59	1	17	0	0
Strawberry fruit	5	23	-	-	1 (a)	1 (a)
Cut flowers	6	39	3	26	1 (a)	1 (a)
Peppers	4	27	1	17	1 (a)	1 (a)
Melons			-	-	0	0
Eggplant	2	19	-	-	0	0
Others: orchard replant, carrots, raspberries	4	58	1	2	0	0
Nursery						
Strawberry runners	5	27	4	25	2	3
Others nursery: ornamental trees, orchard, forest trees	2	8	-	-	0	0
Post-harvest						
Mills and structures	6	46	1	26	0	0
Commodities and others	7	30	3	9	1	5
Total all sectors	**10**	**128**	**5**	**57**	**2**	**7**

(a) MB was permitted for research purposes only

2.4 Methyl bromide and needs of pest control operators

The business of some pest control operators (PCOs) including fumigators, relied primarily on sales of MB for fumigations, while other developed more diverse activities (e.g. disinfestation and pest control services that use a wide variety of fumigants, pesticides, IPM and non-chemical methods).

[39] BE(11); DE(1); EL(36); ES(7 distributors and fumigation companies); FR(16); IT(39); NL(1); PL(4); PT(2);UK(11).

As a result of MB consumption reduction, the diversification of services became necessary for those willing to pursue pest control activities. When doing so, new services were offered to their current customers, with the potential to expand their customer base to new areas and, thereby, to gain new customers.

Many PCOs, including fumigators, offer alternative fumigants or alternative methods (steam/heat systems), supply of equipment, products and materials related to the use of alternatives, skilled pest identification and monitoring services, user training and consultancy services. Some former MB PCOs report that sales of pest monitoring and advisory services are as profitable as selling MB fumigations alone (H. Lange, *pers. comm.*).

2.5 Pest control needs of growers in the soil sector

Growers value MB because it has been a cost-effective and familiar tool for controlling pests in soil. MB has been used for such a wide variety of crop situations that it may appear to be indispensable to some growers. However, MB is just one pest control tool amongst many available. The worldwide experience in phasing out MB has demonstrated that there is no one-for-one direct substitute and that growers need to use combinations of alternative techniques (chemical and/or non-chemical) to replace MB. The EC Database on MB alternatives indicates many of the existing alternatives (Annex 4.C of this ECMS report, available at http://ozone.unep.org/Exemption_Information/Critical_use_nominations_for_methyl_bromide/National_Management_Strategy_for_Phase.shtml). Rather than needing MB itself, growers require cost-effective methods for controlling or managing soil-borne pests so that adequate yield, market-acceptable quality, and profit can be achieved.

In the case of nursery crops, some growers also have to meet national or export certification standards that require products to be free from certain categories of pests or diseases. In various EC Member States, strawberry runners are certified as "pure varieties" that are substantially free from pests (including weeds) that can reduce the quality of the planting material. Annex 4.D provides details on certification standards for strawberry runners in the Netherlands and Poland.

Many growers have benefited from the conversion to MB alternatives in horticultural production. The Netherlands, which used to be the largest MB user in Europe in the 1970s, implemented a policy in the early 1980s to phase-out MB. The elimination of MB benefited growers because it stimulated the widespread development of new and modified production techniques; it enhanced technical innovation and modernisation (De Barro 1995, MBTOC 2002). Official statistics showed that the production of horticultural crops was maintained and increased during and after the phase-out period (UNEP 1992). Denmark, which phased out MB in 1998, also experienced improvements, finding that certain types of alternatives provide higher yields and greater profitability (Gyldenkaerne *et al*. 1997; Rasmussen *pers. comm.*). In the Valencia Region in Spain in the 1990s, plastic for solarisation was subsidised, and this technique was spread avoiding MB use. Although plastics are no longer subsidised, solarisation is currently still being implemented and profitable. Annex 4 provides examples of the main alternatives adopted in the European Community considering that pest control and agriculture in southern Europe are to a certain extent different from agriculture in northern Europe (e.g. soil conditions, use of land and water).

2.6 Pest control needs of food companies, mill owners and other users in the post harvest sector including aircraft fumigations

Similar to growers, mill operators and food companies mainly require cost-effective pest control methods/systems which will enable them to achieve health standards and to provide food products of the quality demanded by supermarkets or purchasing companies. These standards must be met with minimal disruption to their ongoing operations which need to be almost continuous as profit margins are reported to be very small on a per kilogram quantity of product produced.

The standard of one major customer of the UK milling industry demands less than 4 rodent hairs per 500 g of flour and less than 4 insect fragments per 50 g of flour. HACCP requires companies to operate systems and procedures to prevent and minimize contamination, including the use of good hygienic practices.

The French domestic and international trade dictates less than 50 debris for two samples and no rodent hairs in six samples of 50 g flour (P. Ducom, *pers. comm.*). In Greece, some mill customers aim for no dead or alive insects and no sign of rodent activity (V. Sotiroudas, *pers. comm*.). Also in Greece, the tolerance for contamination in dried fruit is 0% in raisins & sultanas and 5% in figs.

In the aviation industry in the UK, if a rodent is found on board, aircraft are taken out of service until the rodent is proved to have been removed.

3 Methyl bromide alternatives in the soil and post-harvest sectors

3.1 Introduction

The 4-yearly, comprehensive reports of MBTOC have identified a wide range of alternatives to MB, documented in several hundred pages in each report since 1994 (MBTOC 1994, 1998, 2002, 2006), in addition to update reports that are provided annually by the Technology and Economic Assessment Panel[40]. These alternatives include other fumigants and chemicals, cultural practices, biological controls, physical methods such as solarisation and steam, and combinations of these alternatives.

The most recent MBTOC Assessment report of 2006 identified alternatives for about 95% of the global controlled uses of MB in 2005 including those recorded as CUEs. MBTOC was not able to identify alternatives for situations totalling about 1,200 tonnes of global consumption in 2005[41]. This represents only 1.6% of the official global consumption baseline (71,764 tonnes). The Committee noted that significant effort should be undertaken to implement the alternatives (including registration where necessary) and to optimise their use. It is recognised worldwide that there is no one-for-one substitute that has the same technical properties as MB, and can totally replace MB on its own. In order to replace MB, in particular in the circumstances of nominations, it is normally necessary to use combinations of several alternative techniques (chemical and/or non-chemical).

3.2 Existing alternatives in soil sector

The use of MB for soil treatments accounted for 96% of the MB licensed by the European Community in 2007 and 99% in 2008. However, exemptions allowing the critical uses of MB accounted for a small proportion of the total production of these

40 http://ozone.unep.org/Assessment_Panels/TEAP/index.shtml for both TEAP and MBTOC reports

41 Methyl Bromide Technical Options Committee (2007) Assessment Report of 2006, UNEP Nairobi, p.4, p.28.

crops in the EC, in cases where alternatives were not technically or economically feasible.

Table 3.1 provides an overview of existing pest management tools that have assisted in avoiding MB in the soil sector. Annex 4 provides details of alternatives for each major crop in the EC. Normally these pest control methods need to be used in combination in order to control the full range of pests covered by MB. To get effective results comparable with MB it is also necessary to use appropriate methods e.g., effective application equipment, relevant soil preparation.

Table 3.1: Summary of main pest management components used in commercial practice as MB alternatives in the soil sector (February 2009)[42]

Pest management tool	Pest group(s) controlled in general [(a)]
Chemical	
Chloropicrin	Soil borne fungi
1,3-D [(b)]	Nematodes
Dazomet	Nematodes, soil borne fungi, weeds
Metam Sodium	Nematodes, soil borne fungi, weeds
Nematicides	Nematodes
Fungicides	Soil borne fungi
Herbicides	Weeds
Non-Chemical	
Rotation of crops	Nematodes, soil borne fungi and bacteria, weeds
Biofumigation	Nematodes, soil borne fungi and bacteria, weeds
Grafting on resistant rootstock	Nematodes, soil borne fungi and bacteria
Resistant varieties	Nematodes, soil borne fungi and bacteria
Soil steaming	Nematodes, soil borne fungi and bacteria, weeds
Hydroponics, soil less cultivation	Nematodes, soil borne fungi and bacteria, weeds
Substrates, growing media	Nematodes, soil borne fungi and bacteria, weeds
Soil solarisation	Nematodes, soil borne fungi and bacteria, weeds
Mulches	Weeds
Mechanical weeding, cultural practices to reduce weeds	Weeds

(a) Pest groups controlled when the pest management tool is applied in an appropriate manner, using effective application equipment, soil preparation, etc. There may be exceptions for certain specific species.

(b) Excluded from Annex I to Directive 91/414, MSs may grant use until 20 March 2009. Following a review of the impacts of withdrawal on the use of MB, the standard grace period was not extended. The manufacturer has applied for re-registration in June 2008. The final results of the risk assessment are expected by the end of 2009.

Not included in Table 3.1 is pest monitoring, which according to good agricultural practice guidelines should be the basis for any pest control activity. In 2005 Belgium implemented a system of soil sampling and testing for soil pathogens, prior to authorising MB for soil fumigations, which reduced MB use by approximately 70% in

[42] See regulatory status in table 4.1

one year. In the Netherlands, soil sampling and testing is done as a standard practice prior to growing various nematode susceptible crops, to avoid unnecessary (expensive) treatment of fields with chemical pesticides. In Spain, any treatment has to be authorised by a technical supervisor based on infestation levels in cultivations under IPM programmes, so avoiding unnecessary treatments.

It should be stressed that, in addition to the pest management tools listed here, many other (cultural) practices are widespread. These, integrated with other crop management measures, contribute to the management of soil pests in general, such as sanitation, various methods of tillage, balanced fertilisation, irrigation control, optimising planting time, choice of seed / planting material, planting distance and habitat management, and the timing of pest control activities. IPM integrates the available pest control methods to achieve a grower's most effective, economical, and sustainable combination for a particular local situation, and is based on good knowledge of the pest spectrum as well as the impact of combining various tools to control pests.

3.3 Alternatives under development in soil sector

Several new products and techniques are under development. It is important to continue to develop and deploy additional methods that will meet the current and future standards demanded of pest management techniques in the soil sector, particularly the environmental and health criteria of Directive 91/414/EEC. New chemical products would require registration by the EC and national pesticide authorities before they can be used, a process that has traditionally been very slow unless fast-track procedures are implemented (refer to section 4.2). However, non-chemical products, such as the steam/heat treatments listed below, can start commercial production much sooner because they are not required to be registered as pesticides.

Various chemical products are being trialled *in the EC* and would require pesticide registration before use:

- France, Italy and Spain are in the process of testing dimethyl disulfide (DMDS). Preliminary results indicate that DMDS can provide yield equal to MB when combined with other treatments such as chloropicrin (PIC) plus Virtually Impermeable Film (VIF) (López-Aranda *et al*. 2004);
- Spain is in the process of testing propylene oxide, ethane dinitrile (EDN), sodium azide and iodomethane.

Non-chemical products that are being trialled in the EC for which no registration is required include:

- Equipment for carrying out hot air treatment of soil, which has been tested in the Netherlands and Cyprus. Commercial production of equipment commenced in 2006;
- New steam equipment is under development in Italy;
- Solarisation, antagonists, biofumigation and other techniques are under further development in Spain and Italy;

- Additional resistant cultivars are under development in many countries.

The following chemical and non-chemical methods are being tested and/or registered *outside the EC*:

- Iodomethane alone or combined with PIC has been found to be effective (MBTOC 2005). Iodomethane was registered by the US EPA in 2007 (TEAP 2008)[43] and is being tested/registered in Australia and other countries;[44]
- Ethane dinitrile (EDN) shows equivalent weed / disease control and crop yield compared to MB in for strawberry runners for example (Porter 2004a, MBTOC 2005). EDN is in the registration process in Australia;[35]
- Sodium azide gives good control of weeds and nematodes using some application methods (MBTOC 2005);
- Dazomet has been registered in the USA for additional crops (strawberries and tomatoes);
- DMDS has shown promising results, and is in the registration process in the USA as a soil fumigant for cucurbits, strawberries, tomatoes, peppers, eggplant, cucurbits, field ornamentals and forest nurseries.[45]
- Registration of metam sodium is expanding to additional crops in Israel.[46]

3.4 Existing alternatives in post-harvest sector

Exemptions in the post-harvest sector accounted for 4% of the methyl bromide licensed in 2007, and 0.2% % in 2008. In food premises, pests are now managed using pest control techniques other than MB. Table 3.2 provides an overview of the pest management techniques available as alternatives to MB in the post harvest sector. Annex 4 provides details on alternatives for each major post-harvest use in the EC.

Often these tools need to be used in combination in order to control the full range of pests. Correct application methods and know-how are necessary for achieving results comparable with MB.

Not included in Table 3.2 is pest monitoring which, according to standard IPM guidelines in food industries such as milling, should be the basis for any pest control activity. Several booklets and case studies have illustrated the importance of IPM as the basis for MB alternatives in milling and food processing (e.g. Methyl Bromide Industry Government Working Group (Canada) 1998; Asthon & Lange 2000; MBTOC 2002; and UNEP 2002).

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[43] Notice of Pesticide Registration, Midas ™, EPA Reg Number 66330-43, Oct 5 2007, US Environmental Protection Agency Office of Pesticide Programs, Washington DC. By October 2007 registration had occurred in all but 7 states, for strawberry, pepper, tomato, field grown ornamentals (TEAP 2008, p.102).

[44] Technology and Economic Assessment Panel Progress Report April 2007, UNEP Nairobi, p.62.

[45] TEAP Progress Report April 2007 p.61, 62; US EPA website accessed March 2009.

[46] TEAP Progress Report May 2008, volume I, p.102.

Table 3.2: Summary of main pest management components used in commercial practice as methyl bromide alternatives in the post harvest sector

Pest management tool	Pest group(s) controlled
Chemical	
Phosphine [47]	Insects, mites (may require 2nd treatment), rodents
Sulfuryl fluoride	Insects, termites, rodents
Hydrogen cyanide	Rodents, insects
Various contact insecticides	Insects
Various acaricides	Mites
Non-Chemical	
Heat	Rodents, insects, mites, fungi
IPM (including intensive cleaning programmes, inspections, monitoring, trapping and selected use of compatible pesticides)	Rodents, insects, mites, fungi
Controlled atmosphere	Rodents, insects
Nitrogen	Insects, rodents
High pressure + CO_2	Insects, rodents
Vacuum-hermetic systems (low pressure)	Insects, rodents
Freezing with liquid air or liquid nitrogen	Insects
Aeration and cooling of stored grain during cold/dry winter days	Insects
Entoleters, similar mechanical methods	Insects
Packaging under modified atmospheres or vacuum, insect-resistant packaging	Insects
Sanitation (as required under Good Hygiene Practice)	Rodents, insects, mites, fungi, bacteria
Trapping and monitoring	Insects, rodents
Hot water	Insects, mites, bacteria
Steam	Insects
Ozone	Cheese mites
UV light	Cheese mites

3.5 Alternatives under development in the post-harvest sector

It is important to continue to develop and deploy additional methods that will meet the existing and future regulatory requirements relating to pest control techniques in the post-harvest sector, particularly the environmental and health criteria of Directive 91/414/EEC and Directive 98/8/EC. Several new products are under development outside the EC in the post-harvest sector. Examples of interesting developments in chemical product registration in other regions, which would require pesticide registration before use in the EC (refer to section 4.2):

47 Needs to be combined with corrosion avoidance practices when necessary

- Ethyl formate plus CO_2 was recently registered in Australia for the disinfestation of stored grain, oilseed, grain storage premises and equipment and fumigation of horticultural products (MBTOC 2005);
- Propylene oxide has been registered for nuts in California, USA[48]
- Sulfuryl fluoride + MITC has been registered for the treatment of pests on timber imported into Japan;[49]
- Iodomethane has been registered as a treatment for imported timber in Japan;[50]
- EDN is in the registration process in Australia.

Non-chemical products or methods that are being trialled in the EC, which do not normally require registration:

- Hot water dipping for dried fruits (figs) in Greece and strawberry runners in the Netherlands;
- Controlled atmospheres for strawberry runners in the Netherlands;
- Cold treatments for dried fruits (figs) in Greece;
- CO_2 and N_2 in vacuum for dried fruits (figs) in Greece;
- CO_2 and vacuum packing in rice in Spain;
- Heat treatment for large mills in Poland (currently successfully in use for smaller empty structures).
- High pressure + CO_2 for medicinal herbs in Poland (used for commercial operations in a facility in Poland since July 2007).

3.6 Awareness raising

A very important factor has been awareness raising among MB fumigators and importers who continued promoting the use of MB even though some also provided alternatives. MB end-users often relied strongly on MB and their fumigators for many years and were not familiar with the other methods available for controlling pests. Fumigators have played a key role in spreading information about alternatives. The lack of know-how and necessary equipment can be solved in a relatively short period of time. But encouraging users to adopt an alternative can be difficult in situations where a commercial infrastructure involving importers, producers, distributors, PCOs and end users has been in place for decades, and continues to promote and support the use of MB.

Academic papers about alternatives do not provide the type of information that PCOs and end-users need, because such papers normally discuss only the results of trials, and rarely give details about practical use at the commercial level, the cost of the treatments or information that would convince local MB users.

48 California Department of Pesticide Regulation (2004) Registration of propylene oxide.
49 TEAP Progress Report May 2005, p.139.
50 TEAP Progress Report May 2005, p.139.

As a result, growers often did not have ready access to tailor-made information on specific MB alternatives. Yet, growers are dealing with increasingly competitive markets that demand high quality produce for a low price and, at the same time, with more pressing production problems related to, for example, reduced soil fertility and pest resistance. In addition, novel technologies are often perceived as being beyond the reach of many growers that cannot afford the investment in time and money to adopt better crop production systems. More attention is needed to improve the knowledge system of former MB users and end-users.

Member States have organised local conferences with their stakeholders to promote the use of alternatives. Working with partners such as UNEP and national governments, the European Commission also organised and/or co-hosted several conferences on MB and alternatives, in Spain in 1997 (Bello *et al.* 1998), Italy in 1998 (UNEP 2000), Greece in 1999 (Arvanitakis *et al.* 1999), Spain in 2002 (Bolivar & Batchelor 2002), and Portugal in 2004 (Batchelor & Alfarroba 2004). These have led to useful publications and discussions and undoubtedly contributed to awareness raising and the dissemination of knowledge about alternatives and their use.

In addition, case studies on alternatives have been published by MBTOC, UNEP and others (MBTOC 1998, 2003, 2007; UNEP 2000, 2002). Examples of regional information provision include the Nordic Council publications on MB alternatives relevant to Scandinavia in the 1990s. Furthermore, pest control companies (including MB users) that seek new business opportunities can play an important role in advertising and developing markets for alternative methods.

Despite the above awareness-raising activities carried out by MSs and the Commission, information transfer is most important and needs to continue at the practical level, relevant to the specific pest species and circumstances that are faced by growers and users at local level.

Knowledge of farming is not only held by growers, PCOs, extension and research groups, but also by stakeholders such as supermarkets, other companies that purchase farm products, consumers and credit suppliers. For the efficient maintenance of technically and economically suitable MB alternatives, the most important stakeholders will need to support the transfer and further dissemination of alternatives that are used successfully in other localities for the same crop production systems.

4 Adoption of alternatives

4.1 Development of alternatives

Research programmes have been carried out in a number of Member States. In some cases they aimed to develop new or novel alternatives. More commonly they aimed to improve the application methods of existing alternatives, or to make existing alternatives suitable for a wider range of uses.

In Spain, for example, a specific soil MB alternatives programme has been conducted since 1997, involving scientists, agronomists, fumigators, growers and government departments. Headed by teams that were trusted by the agricultural sectors, quick MB reductions were immediately achieved through dose reductions and PIC mixtures. Several chemical options were considered, e.g. 1,3-D, PIC, metam sodium, dazomet, DMDS, propylene oxide, enzone, EDN, etc. Non-chemical options considered included solarisation, biofumigation, grafting, steam, substrates, biological antagonists, microwaves, etc. Alternative fumigants have been adopted and emphasis has been put on non-chemical options, mainly biofumigation and grafting. As described in section 3, the continued development of pest control techniques is essential for meeting the current and future requirements under Directive 91/414/EEC and other legislation.

4.2 Registration of chemical alternatives

4.2.1 Types of alternatives that are subject to registration

Chemical products and biological control products are generally required to be registered as pesticides or biocides under EC and Member State legislation before they can be sold or used. Registration may occur for specific crops/uses or for general categories such as ‘soil fumigation’.

Tables 4.1 and 4.2 list the main chemicals that are registered in the EC for soil and post-harvest uses, in comparison to other industrialised countries that still use MB

(also refer to Annex 6). The tables indicate that, within the EC, a number of products are registered and that a few additional products are in the process of registration, however the traditional soil fumigants are currently registered for a limited period of time under Directive 91/414/EEC. Outside the EC, the registration of fumigants and combinations is more common or widespread.

Table 4.1 Regulatory status of MB and chemical alternatives in soil sector, in the EC and selected Third Countries (status in February 2009)[51]

Product	EC	Australia	Canada	Japan	USA
Methyl bromide	RL in [3] MS [52]	R	R	R	R
1,3-Dichloropropene (1,3-D)	RL in [6] MS I at EC level [53]	R	R	R	R
Chloropicrin (PIC)	RL in 5 MS I in 1 MS	R	R	R	R
Dazomet	RL in 12 MS	R	R	R	R
DMDS	I in 1 MS				I
Ethane dinitrile		I			
Sodium tetrathiocarbonate (Enzone)	RL in 2 MS [54]				R
Iodomethane		I			R
Metam potassium	R in 4 MS	R			R
Metam sodium	R in 11 MS	R	R	R	R
1,3-D + PIC	RL in 3 MS	R	R	R	R
Nematicides (various)	R in 27 MS	R	R	R	R
Fungicides (various)	R in 27 MS	R	R	R	R
Herbicides (various)	R in 27 MS	R	R	R	R

KEY:
R = Registered
RL = Registered for a limited period of time
I = In process of registration or re-registration
MS = Member States

[51] Table summarizes available data from TEAP May 2005, TEAP Oct 2005, TEAP April 2007, EC Decisions, ECMS Annex 4.C and other relevant sources. Some products are registered for specific crops or situations; in other cases they are registered for general soil fumigation. ECMS Annex 6 provides details.

[52] Commission Decision 2008/753/EC on the Non-Inclusion of Methyl Bromide in Annex I to Council Directive 91/414/EEC requires the withdrawal of authorisations for plant protection products (pesticides) that contain methyl bromide by 18 March 2009 (Official Journal L 258, 26.9.2008, 68-69). MSs may grant a grace period for the use of existing stocks of plant protection products containing MB until 18 March 2010, provided that those uses are also authorised under Regulation (EC) No 2037/2000 on ODS.

[53] The EC review under the Plant Protection Products Directive 91/414 allowed the use of 1,3-D up to 20 March 2009 . Following a review of the impacts of withdrawal on the use of MB, the standard grace period was not extended.. The manufacturer submitted in June 2008 an application for re-registration of 1,3-D under 91/414. The final results of the risk assessment are expected by the end of 2009.

[54] The EC level review under the Plant Protection Products Directive 91/414 did not add this product to Annex I, the list of plant protection products that can be placed on the market in the EC. Greece and Spain can continue to authorise this pesticide until 31 May 2010.

Table 4.2 Regulatory status of MB and chemical alternatives in post-harvest sector (status in February 2009)[55]

Product	EC	Australia	Canada	Japan	USA
Methyl bromide	RL in [3] MS (a)	R	R	R	R
Ethyl formate		R [56]			
Ethane dinitrile (cyanogen)		I			
Hydrogen cyanide, calcium or sodium cyanides	RL in [2] MS (a) [57]		R [58]	R	
Iodomethane				R	
Methyl isothiocyanate (MITC)	N			R	
Phosphine (solid)	R in 18 MS	R	R	R	R
Phosphine (gas)	R in 3 MS	R	R		R
Phosphine gas in carbon dioxide or nitrogen	R in 2 MS	R	R		R
Propylene oxide					R [59]
Sulfuryl fluoride	R in 13 MS I in 2 MS	R	R	R	R [60]
Insecticides (residual or aerosol, suitable for use in IPM programmes)	R in 27 MS	R	R	R	R

(a) The EC level review under the Plant Protection Products Directive 91/414 has led to exclusion from Annex I, the list of plant protection products that are registered in the EC.

KEY:

R = Registered

RL = Registered for a limited period of time

I = In process of registration or re-registration

MS = Member States

4.2.2 Types of alternatives that are not subject to registration

The registration of many non-chemical and physical methods is not generally required in the EC as they are not considered to be pesticides or biocides. Examples in the soil sector include heat (e.g. steam, solarisation), substrates, grafted plants and other cultural practices (Smeets, 2004). In the post-harvest sector, some 'physical procedures' are included on a 'basic substances list' and are not required to follow the full registration procedure. Examples in the post-harvest sector include controlled atmospheres (CA) / nitrogen, cold, sanitation, heat, pressure and vacuum. Most non-chemical alternatives are widely permitted in the EC (see Annex 4).

55 For details of permitted uses refer to ECMS Annex 6. Table summarizes available data from TEAP May 2005, TEAP Oct 2005, TEAP April 2007, ECMS Annex 4 and other relevant sources. Some products are registered for specific situations. Annex 6 provides further details.

56 Stored grains, oilseeds, grain storage premises, equipment, horticultural products.

57 Empty food structures, non-food structures, aircraft.

58 Beehives, and control of fungi and bacteria

59 Stored agricultural commodities, nutmeats, cocoa, spices.

60 Non-food structures, mills, food processing sites, dried fruits, tree nuts, cereal grains

4.2.3 EC legislation related to pesticides

Two EC Directives regulate pesticide products, with the aim of harmonising the European market for pesticide active substances and products, while providing protection for humans, animals and the environment:

- The Plant Protection Products Directive 91/414/EEC covers active substances intended to control pests that damage plants or plant products (mainly agricultural pesticides).

- The Biocides Directive 98/8/EC covers active substances intended to control pests that damage items that are not plants or plant products (mainly non-agricultural pesticides, commonly called biocides).

Active substances can be registered only if they are (a) effective and (b) do not have unacceptable effects on health or the environment. New application methods also have to be registered in some situations (e.g. pellets of phosphine or phosphine from generators).

The existing pesticides (called active substances or active ingredients) are undergoing a process of review under this legislation in the EC. The review has covered both MB (section 4.2.4) and alternatives. The review includes a scientific assessment of the safety and environmental data submitted by applicants, leading to inclusion or non-inclusion in a list of authorised pesticides (Annex I to Directive 91/414/EEC) following a detailed decision-making procedure.

4.2.4 Registration status of MB

In the European Union, MB has been evaluated as part of the EC's general review of pesticide active substances (also called active ingredients). Under the EC Plant Protection Products Directive (91/414/EEC, PPPD) a dossier covering the toxicological characteristics and risks associated with MB use has undergone a technical risk assessment according to the PPPD criteria (EFSA 2006, TEAP 2007). The technical risk assessment noted that MB is highly toxic and mutagenic and identified a number of areas where MB did not meet the requirements for approval under Directive 91/414 (EFSA 2006). As a result, MB has not been included in the list of authorised pesticides (i.e. Annex I of Directive 91/414). Commission Decision 2008/753/EC[61] requires that all authorisations for pesticide products containing MB must be withdrawn by 18 March 2009 in the EC. New authorisations for products containing MB had to be withdrawn by 26 September 2008. MSs are able to grant a grace period for using existing stocks of plant protection products containing MB until 18 March 2010, provided that those uses are also authorised under the Regulation on ODS (Regulation (EC) No 2037/2000). Since no CUEs are authorised in 2009, this means MB stocks could only be used for QPS if so authorised. No pesticide use of methyl bromide (including for QPS) can be authorised after 18 March 2010.

[61] Commission Decision 2008/753/EC, Official Journal L 258, 26.9.2008, p.68-69.

Under the Biocides Directive (98/8/EC) MB was "identified" which means that biocidal products containing MB were allowed to be placed on the EU market until 1 September 2006 at the latest, according to Article 4(2) of Regulation 2032/2003. Two[62] authorised critical uses of MB in 2006 were categorised as 'biocidal' uses in three Member States, and therefore MB was not permitted for these CUEs from 1 September 2006. The Commission could potentially authorise a Member State to use MB for biocidal uses after this date if the Member State demonstrated full compliance with the criteria for an "essential use" for biocides under Article 4a of Regulation (EC) No 2032/2003, and if a CUE had been authorised. However, in practice, 'essential uses' for the use of MB as a biocide have not been granted. In 2006, the use of MB for cheese stores was not identified as "essential" under the Biocidal Products Directive. In addition, no MB CUE request was made for artefacts and no biocidal MB use was licensed for 2007.

4.2.5 EC review of pesticides

As part of the on-going EC review of pesticides, decisions were adopted in 2008 on PIC and dazomet, and a decision is expected to be adopted on metam in 2009. 1,3-D was reviewed on an earlier timetable in the EC, and its use was banned after 20 March 2009. Recognising the role of 1,3-D as an alternative to MB, and to achieve the objectives of the Montreal Protocol, an 18 month extension of this grace period was considered, based on a review to assess the concrete impact of its withdrawal on the use of MB.[63] Based on available evidence, the standard grace period was not extended, as other alternatives were available during the period concerned, and emergency uses for 1,3-D could be authorised by Member States. The manufacturer of 1,3-D has submitted additional technical information and applied in June 2008 for re-registration of 1,3-D under Directive 91/414. The final risk assessment is expected to be available before the end of 2009.

Progress on the status of the evaluation of each chemical is available on the website of DG SANCO (Annex 5 provides further details).

4.2.6 Registration of new pesticides

Annex 5 outlines the main procedures for registration of new pesticide active ingredients in the EC. Applications for registration of chemical products are submitted by the manufacturers of products, not by governments.

The registration of new chemical products is normally a very expensive and time-consuming procedure. The registration of sulfuryl fluoride for use in flour mills, for example, took several years and required substantial financial and scientific investment from the manufacturer, with input from research institutes and users in several countries.

The cost and complexity of registration has often deterred manufacturers from making applications to register new chemical products, in particular in Member States where

62 Fumigation of museum artefacts in Italy and Belgium, and the fumigation of farmhouse cheese stores in the United Kingdom to control cheese mites.

63 Commission Directive 2007/619/EC.

the potential market for those new products would be small. This is an obstacle since it is necessary to increase the range of chemical alternatives available to users.

However, the EC has made efforts to speed up the registration of new products that have lower toxicity compared to traditional products. This has substantially reduced the registration processing period and cost for some products, and thus makes registration/authorisation more feasible, even for SMEs.

For example, a new nematicide (a suspension concentrate containing xanthan gum) was reviewed and authorised for use in the EC in about 12 months. This indicates that products with lower human toxicity have a much greater potential for rapid registration than more hazardous chemicals. Manufacturers are strongly encouraged to register such less hazardous products for use in the EC.

4.3 Rates of adoption of alternatives and market penetration

The 16th Meeting of the Parties in Prague provided guidance to MBTOC in the "Working Procedures for MBTOC" (Decision XVI/4, paragraph 35 of Annex I) requires MBTOC to calculate the likely time period for the adoption of alternatives based on factors such as number of fumigation/PCO companies, estimated training time assuming full effort, and opportunities for importing alternative equipment and expertise if not available locally (see Annex 2).

Experience has shown that certain types of MB alternatives can be adopted at a rapid rate when encouraged by certain factors. Such factors include training (organised by PCOs, agricultural institutes, extension, governments or grower / miller associations), market pressures (see section 6) or a reduced supply of MB, for example. A summary of experienced, and therefore feasible, rates of adoption of alternatives in major crops in the soil sector is given in Table 4.3 (further details in Annex 7.A). The restrictions under Directive 91/414 now limit the adoption of many traditional soil fumigants, however the information about fumigants in Table 4.3 may be relevant to fumigants in the process of, or expected to be submitted for, re-registration (e.g. 1,3-D, PIC), new fumigants (e.g. iodomethane, DMDS, EDN), and combinations.

4.4 Promoting adoption of alternatives

4.4.1 National plans and restrictions on methyl bromide

In addition to the controls implemented under the Montreal Protocol and the EC Regulation, a number of countries adopted national plans for MB phase-out, which specified regulatory requirements, policies, adaptive research, technology transfer and other activities.

Examples of Member States that developed national plans include the Netherlands, Denmark (section 3.2), Italy and many developing countries that are implementing Montreal Protocol projects. In Italy, a national ordinance that was issued by the Health Ministry in 1994 limited the frequency of MB soil fumigation to once every two years at the most, to reduce the use of MB. Spain adopted high-PIC formulations and reduced MB doses to achieve significant MB reductions.

Table 4.3 Examples of rates of adoption of methyl bromide alternatives in individual Member States of the EC (Summary of data in Annex Table 7.A)

Alternative technology	Crop / use	Actual rates of adoption in individual MSs (ha/year in individual countries)
Soil sector		
Fumigants (e.g. 1,3-D, PIC, metam, dazomet, various combinations)	Strawberry fruit	up to 2080 - 2090 ha/year
	Strawberry runners	up to 87 - 94 ha/year
	Tomato (a)	up to 838 - 1193 ha/year
	Peppers (b)	up to 667 ha/year
	Cut flowers (b)	up to 313 ha/year
Grafting on resistant rootstock (e)	Tomato	>10 million plants/year, approx. 1000 ha/year (c)
	Eggplant	4.3 million plants/year, approx. 130 ha/year (d)
Substrates and hydroponics	Strawberry fruit	up to 60 – 80 ha/year
	Tomato	up to 1570 ha/year
	Pepper	up to 175 ha/year
	Cucumber	up to 507 ha/year
Steam	Cut flowers	up to 917 ha/year
All types of soil alternatives (unspecified)	Cut flowers, bulbs (f)	up to 268 ha/year (several MSs)
Post-harvest sector		
Sulfuryl fluoride, heat and/or IPM	Mills and food processing facilities	up to 3,500,000 – 4,600,000 m^3 / year
Heat treatment	Mills and pasta facilities	> 296,117 m^3 / year
	Airplanes, silos	up to 22,500 m^3 / year
High pressure CO_2	Dried herbs	approx. 46,500 m^3 / year
Modified atmospheres	Structures (rodent control)	200,000 m^3 / year

(a) Adopted mainly fumigants, also grafted plants
(b) Adopted mainly fumigants, also other types of alternatives
(c) Assuming 10 million grafted plants = 1000 ha (Miguel 2004)
(d) Assuming planting distance of 40 * 75 cm.
(e) Usually combined with other treatment or used as part of IPM programme.
(f) Adopted mainly fumigants and substrates

The EC and national authorities responsible for registration or controls on pesticides were strongly encouraged to urgently de-register all uses of MB, with the exception of authorised critical uses. This was intended to help prevent potential illegal use of MB by growers or enterprises that may not be aware that the use of MB is no longer permitted except when authorised by a Commission Decision.

4.4.2 Stimulating a conducive economic environment

As described in Chapter 3, different types of MB alternatives are available worldwide. However, existing market forces often did not allow for rapid adoption, particularly where supplies of MB were available to users. One of the arguments made for continued reliance on MB was the potential cost of switching to MB alternatives. Some countries or organisations addressed this issue by aiming to create a more conducive economic environment, as illustrated by the following examples:

- In the Slovak Republic, MB was used regularly for post harvest treatments up until 1998 when a tax was placed on imports of MB (and other ODS) to (1) create an economic disincentive for use, and (2) to generate revenue for the state Environmental Fund for ozone layer protection work. As a result, phase-out became complete in 1999, with phosphine as the cheaper MB alternative (Slovak Republic survey report for UNEP, 2000). The same action was taken by the Czech Republic.

- Agricultural government grants or bank loans have also worked to promote the adoption of MB alternatives. In Italy, the regional government of Ragusa in Sicily in the 1990s promoted new agricultural technologies by subsidising the cost of plastic used as solarisation sheets (25% of costs reimbursed), machinery (13% of costs reimbursed) and irrigation systems. The Valencia region of Spain subsidised plastics for solarisation in the 1990s, which helped to spread the use of this technique, avoiding some MB use. Now solarisation is implemented it is profitable although the plastics are no longer subsidised.

- Sector associations have also played an active role in the promotion of MB alternative adoption. In Spain, the Association of Exporters of Fruit and Vegetables (COEXPHAL), requested growers to stop the use of MB as part of a requirement to meet environmental quality standards for exports. As a result by 2002, the majority of MB users on 1430 ha in the intensive horticultural region of Almería adopted alternatives in a relatively short period of time. Almería is the main region in Spain that supplies fresh vegetables to large supermarket chains in northern Europe.

- Similarly, supermarkets and food manufacturers have set company specifications for product quality. In the UK, the “CO-OP” supermarket chain banned the use of MB on farms owned by the supermarket in the mid-1990s. 'CO-OP' and 'Marks and Spencer' developed some codes of practice that excluded the use of MB by growers for supply to these supermarket chains.

- Several international agricultural certification programmes determine standards and procedures for ‘Good Agricultural Practices’ in crops grown to supply supermarkets and other wholesale purchasing companies. The standards of GlobalGAP (formerly known as EurepGAP), and MPS-GAP, for example, do not permit the use of MB in the production of cut flowers and ornamental plants. Thousands of growers in the EC and around the world comply with these standards.

4.4.3 Training and technology transfer

As described in Section 3.5, MB users need practical information relevant to the control of local pests in their circumstances. Technology transfer is substantially more successful when MB users become convinced of the benefits of MB alternatives, which can happen, for example, through:

- Hands-on training sessions, that allow for building local, successful experiences;
- Information exchange through field days, study visits, workshops;
- Provision of practical materials, illustrated step-by-step training manuals, information / fact sheets, background information websites, regular newsletters.

One of the key elements of programmes in the EC for implementing MB alternatives is the transfer of technology – transferring the results of research and development. Field visits, conferences, workshops, demonstrations and technical training have been the usual tools of these programmes, leading to the phase-out of more than 19,735 tonnes MB in all Member States. The continued transfer of additional pest management techniques will remain an important activity, as described in chapter 3.

Training in MB alternative methods for MB users has been carried out in many sectors in the EC, as illustrated by the following examples:

- Training sessions were carried out in Poland, Hungary, Latvia and Lithuania as part of a regional GEF project 'Total MB Sector Phase out in CEITs'. They carried out a comprehensive training programme on the use of MB alternatives in 2006 and 2007, focussing on non-chemical methods.
- Spain carried out training as a part of programmes on MB alternatives that started in the soil sector already in 1997.

5 Procedures and principles to determine the quantity of methyl bromide eligible for a critical use

Methyl bromide consumption was phased out in 2005 with the exception of certain authorised CUEs until 2008. The Parties to the Protocol have recognized that CUEs *"are intended to be limited, temporary derogations from the phase-out of methyl bromide"* (Decision Ex.I/3) and that *"each Party should aim to significantly and progressively decrease its production and consumption of methyl bromide for critical uses with the intention of completely phasing out methyl bromide as soon as technically and economically feasible alternatives are available"* (Decision Ex.I/4). Any CUEs for methyl bromide in the soil and post harvest sectors should therefore be phased out as soon as technically and economically feasible alternatives are available.

The strategy for achieving this phase-out allowed a user access to methyl bromide for very specific, limited uses if alternatives were not available but, at the same time, ensured that MB use was eliminated where an adequate alternative was available.

This chapter defines the stepwise procedures that were used in the EC for determining when all or part of a request for methyl bromide met the criteria for a critical use. The approach incorporates in a "Decision Tree" the criteria for eligibility that are contained in the Decisions of the Montreal Protocol and in Regulation (EC) No 2037/2000.

5.1 Decision Tree for deciding the eligibility of methyl bromide for critical uses

The Decision Tree presented in Figure 5.1 was used for determining the quantity of methyl bromide eligible for a critical use exemption in both the soil and post-harvest sectors. It is primarily based on the criteria of Decision IX/6 and other relevant Decisions described in Chapter 1 and Annex 2, and Articles 3(2) and 4(2) in Regulation (EC) No 2037/2000.

5.2 Guiding Principles and Definitions

Tables 5.1 and 5.2 provide "Guiding principles" and "Definitions" for particular terms used in the Decision Tree. These terms and definitions applied to applications for critical uses of methyl bromide that were included in the EC Nomination to the Parties, and to the licensing of methyl bromide for critical uses by the European Commission. Annex 1 provides a list of relevant tables that were updated annually, such as the EC database on registered and available alternatives.

Table 5.1: Guiding principles for critical uses

Principles
Exemptions must comply fully with Regulation (EC) No 2037/2000, Decision IX/6 of the Montreal Protocol and other relevant Decisions
The following uses of methyl bromide are not normally expected to be permitted, unless in exceptional circumstances: • Uses that are new or have already been found not to comply with the criteria for CUE; • Increase in methyl bromide compared to previous year that methyl bromide was used; • Any increase in crop area or volume that increases MB consumption must be achieved with the use of alternatives, if available
Methyl bromide should only be used: • As a last resort when no other alternative is available; • At the lowest possible dose; • As infrequently as possible in combination with other alternatives;

Figure 5.1: Decision Tree to determine the quantity of methyl bromide eligible for a critical use. Underlined terms are defined in Table 5.2.

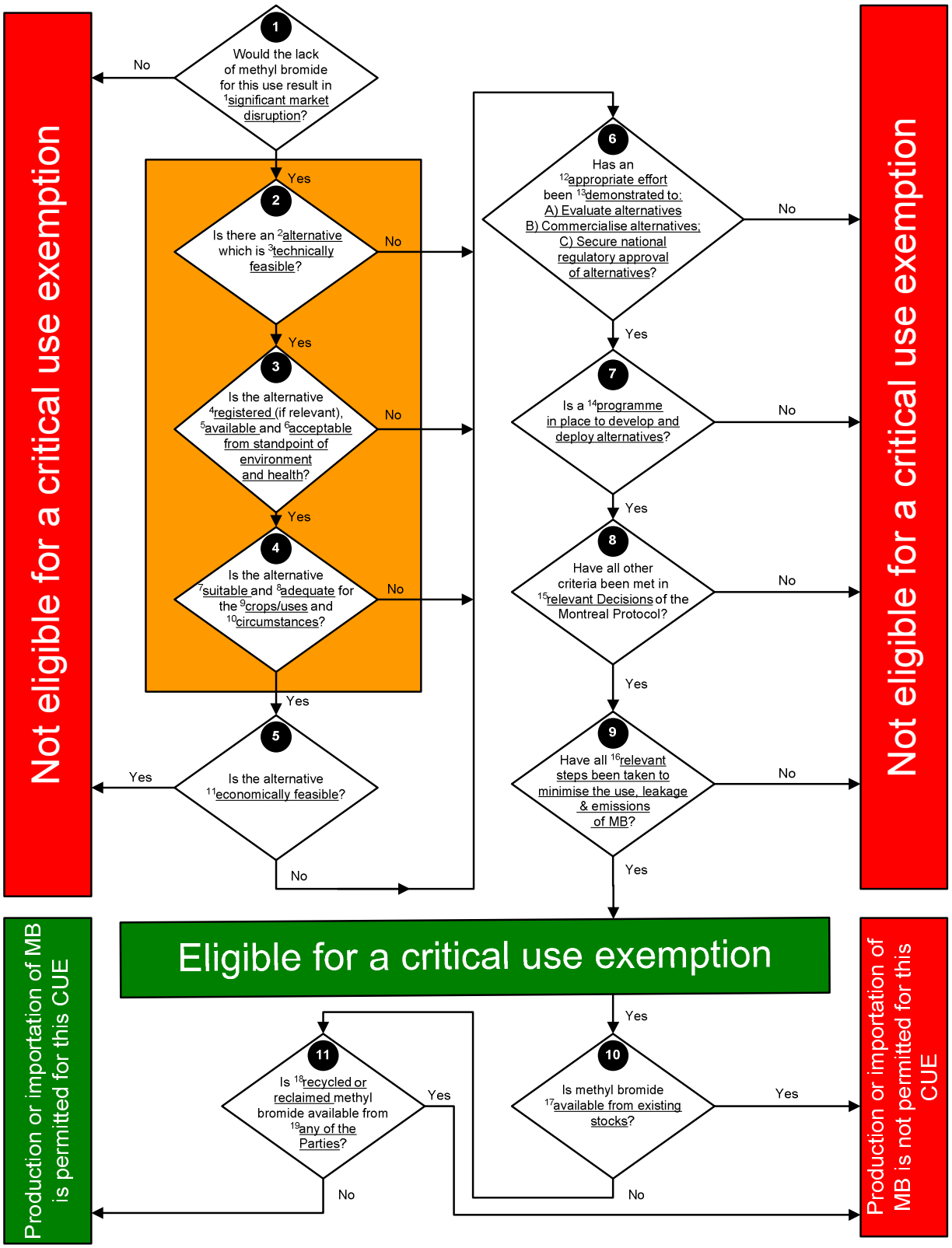


Table 5.2 Definitions relating to alternatives and the use of the Decision Tree shown in Figure 5.1

No.[64]	Terms	Definitions and explanations
1	Significant market disruption	*Refers to significant disruption to the market (see below), not disruption to individual users or enterprises, unless the individual or end-user is the predominant supplier to the market.* *Significant market disruption is unlikely:* • *If MB was used on less than 5% of the crop area (soil sector) or less than 10% of the volume (post harvest sector) that used MB plus alternatives in the MS in the year prior to the CUE year;* *or* • *If the calculated percentage reduction of the crop/product on the market, due to the lack of MB and alternatives, is less than the typical percentage fluctuation in production/quantity placed on the market over the past five years.* The "market" refers to an international, national or regional market.
2	Alternative	[65]*Non-chemical or chemical treatments and/or procedures, which are technically feasible for controlling pests, thus avoiding or replacing the use of MB.*
3a	Technically feasible (for soil sector)	*An alternative pest control product or procedure that provides a statistically similar crop yield (kg/ha) of commercially acceptable quality, compared with MB fumigation. Statistically similar crop yield will be within about 5-10% of the yield provided by MB fumigation over 3 years, or a yield that is within the typical range (fluctuation) of crop yield that has occurred from year to year over the past 5 years.*
3b	Technically feasible (post-harvest sector)	*An alternative pest control product or procedure that provides a level of pest control that meets typical health standards and commercial requirements.*
4	Registered	*Officially authorised and/or permitted by the relevant competent authority for a specific crop/use and therefore acceptable from the standpoint of environment and health. All products including non-chemical ones must be registered in the EC if so required under* Directive 98/8/EC ("Biocidal Products Directive", BPD) or Directive 91/414/EEC ("Plant Protection Products Directive", PPPD) (see Annex 5)
5	Available (alternative)	*A suitable alternative obtainable in the EC or imported from third countries, which, at the time of licensing or during the operational period of the exemption, is ready for use in the specific use-category.*

64 Numbers in this column refer to superscript numbers in the Decision Tree (Figure 5.1)

65 Handbook on Critical Use Nominations for Methyl Bromide, 2005, pp 8: http://hq.unep.org/ozone/Information_for_the_Parties/Handbooksandforms_for_CUNandEUN.asp

No.[64]	Terms	Definitions and explanations
6	Acceptable from the standpoint of environment and health	*Officially authorised and/or permitted by the relevant competent authority for a specific crop/use and therefore acceptable from the standpoint of environment and health.*
7	Suitable (alternative)	*A pest control method or procedure that, when applied optimally, produces a crop/product of adequate quality and quantity in the circumstances of the nomination.*
8	Adequate	*Sufficient for one or more specific requirements.*
9	Crops / Uses	'*Crops'* refers to soil applications of alternatives. '*Uses'* refers to post-harvest applications of alternatives.
10	Circumstances	*The sum of factors that contribute towards the production of a crop or product.* Examples to illustrate the definition include soil type, target pest species, temperature when fumigation is carried out, sequence of crops.
11	Economically feasible alternative	*A pest control method/procedure, when examined over a 3-year period, which provides adequate net annual revenue within the range (fluctuation) of annual revenues obtained in the last 4-5 years for the crop/use.*
12	Appropriate Effort	*Deployment of an alternative in the minimum feasible time under the circumstances of the nomination.* Since MB is intended to be completely phased out as soon as technically/economically feasible alternatives are available[66], applicants and MSs are expected to encourage the development, deployment and adoption of alternatives in the minimum time that is feasible.
13	[Applicant has] … demonstrated appropriate effort to (a) evaluate, (b) commercialise and (c) secure national regulatory approval of alternatives	*Evidence, such as publications of research, a description of the appropriate activities that have been carried out to achieve the elimination of methyl bromide in the specific circumstances of the application, including the progress achieved to date, the activities planned for near future, the date when regulatory approval is likely to be forthcoming, and when commercialisation of the alternative is likely.* This definition acknowledges that the manufacturer is the prime proponent of the registration process, but that national governments and the Commission also have a responsibility to encourage a company to register a new product.
14	Programme to develop and deploy an alternative	*Carefully-defined applied research and development to identify and implement one or more alternatives to methyl bromide.*

66 Parties recognise that CUEs are '*intended to be limited, temporary derogations from the phase-out of methyl bromide*', and that '*each Party should aim at significantly and progressively decreasing its production and consumption of methyl bromide for critical uses with the intention of completely phasing out methyl bromide as soon as technically and economically feasible alternatives are available*' (Decisions Ex.I/3 and Ex.I/4). CUEs are intended to be '*…temporary derogations from the phase-out of methyl bromide in that they are to apply only until there are technically and economically feasible alternatives that otherwise meet the criteria in Decision IX/6*' (Decision XVI/4, Annex I, para.32)

No.[64]	Terms	Definitions and explanations
15	Relevant Decisions	*Decisions related to critical uses that have been agreed by the Parties that seek to reduce and eventually eliminate any critical uses of methyl bromide.* '*Parties*' refers to '*Parties to the Montreal Protocol'*. Each of the Member States is a Party. The European Community itself is a Party to the Protocol. There are more than 190 Parties to the Montreal Protocol.
16a	All relevant steps to minimise the use and emissions of methyl bromide (Soil uses)	*Actions that limit both use and emissions of methyl bromide to the smallest amount possible.* It includes "*all the precautionary measures practicable to prevent and minimise leakages of methyl bromide from fumigation installations and operations in which methyl bromide is used*"[67]. "To limit emissions, *the use of virtually impermeable film (VIF) for sufficient time, or other techniques ensuring at least the same level of environmental protection, is mandatory in the European Community*."[26] *VIF is defined as a type of film that has a permeability of less than 0.2 g/m^2 of pure methyl bromide equivalent to 0.05 ml/hour/m^2/1000 ppm methyl bromide*. By retaining methyl bromide and its alternatives in the soil, the pest control properties of both are enhanced with the use of VIF, thereby allowing reductions in dose and consequent emissions. Refer to Section 5.4.
16b	All relevant steps to minimise the use and emissions of methyl bromide (Post-harvest uses)	*Actions that limit both use and emissions of methyl bromide to the smallest amount possible.* It includes *"all the precautionary measures practicable to prevent and minimise leakages of methyl bromide from fumigation installations and operations in which methyl bromide is used"*[68]. The eligible MB dose is the minimum needed to achieve the necessary "Concentration-x-Time" Product (CTP) as shown on the product label for the target pest Refer to Section 5.4.

67 Article 17(2) of Regulation (EC) No 2037/2000.

68 Article 17(2) of Regulation (EC) No 2037/2000.

No.[64]	Terms	Definitions and explanations
17	Available from existing stocks	*MB that has not been put to its intended use in the year in which it was produced or imported, thereby remaining on the market with the potential to be used at a future time, thereby avoiding the production of 'fresh' MB. Stocks from critical uses that are not ready for use in the circumstance of the exemption are considered to be 'unavailable'.* The EC Regulation did not permit MB stocks to be used from 1 January 2006 in the EC, except for approved critical uses. Stocks of MB that were imported for feedstock, laboratory, inward processing or QPS were permitted only for those specific uses and not for critical uses
18	Recycled or reclaimed methyl bromide	*Methyl bromide that has been recovered after fumigation, typically from a fixed facility, and available to be used again in another fumigation. Impure methyl bromide could be 'cleaned' or reclaimed before being used again.* In practice, there are not many facilities worldwide that recover methyl bromide after fumigation and there are few in the EC. Recovery is not applicable to soil treatments using methyl bromide but is technically feasible for commodity fumigations and some structural fumigations.
19	Methyl bromide formulations (soil treatments)	*Dilution of methyl bromide with chloropicrin thereby allowing an increase in area treated without increasing the overall amount of methyl bromide authorised.* Any methyl bromide contained in formulations is considered a controlled substance and must be phased out.
	Strip application	*Application of methyl bromide to only the area where the crop is planted which is typically a raised bed of soil called a 'strip'.* Since the crop is grown only in this bed and not over the entire area, methyl bromide need only be applied to control pests in this strip, thereby reducing the overall amount of methyl bromide required. Strip application is considered not feasible where the MB treatment is done every other year or less.
	Injection method	*Application of methyl bromide directly into the soil.* The injection method is more efficient at distributing methyl bromide than the hot-gas method, thereby allowing less methyl bromide to be used.
	Monitoring	*Checking for the presence of key pests prior to issuing a permit for soil fumigation using methyl bromide, and checking the concentration of methyl bromide during a post-harvest fumigation.* Both actions can significantly reduce the amount of MB used.
	Good level of gas tightness (post-harvest)	*A standard of gas tightness that results in less than 25% of the methyl bromide being released from a facility over a 24 hour period, or less than half the pressure being reduced (e.g. 20 to 9 Pa) in greater than one minute.*

5.3 Methyl bromide use and emissions

In cases where an alternative was not available and the use was eligible for methyl bromide, Decision IX/6 required Parties to take all technically and economically feasible steps to minimize the critical use and any associated emissions of methyl bromide.

Article 17 of Regulation (EC) No 2037/2000 also required *"all precautionary measures practicable [to be taken] to prevent and minimise leakages of methyl bromide from fumigation installations and operations in which methyl bromide is used. Whenever methyl bromide is used in soil fumigation, the use of virtually impermeable films for a sufficient time, or other techniques ensuring at least the same level of environmental protection shall be mandatory".*

5.3.1 Soil Treatments

To limit use and subsequent emissions of methyl bromide from soil treatments, the following criteria were applied to determine the quantity of methyl eligible for a critical use according to the methyl bromide formulation (see definition 18) and its use with VIF (see definition 15a):

1. MBTOC standard doses (which are updated when MBTOC proposes revised doses):

    - MBTOC proposed standard presumption[69] is MB:PIC 50:50 in all soil types for pathogen control, or 67:33 in cases where nutsedge (*Cyperus* spp.) is a problem, except in regions which have not registered such formulations;

    - For strawberries and vegetables: 12.5 or 15.0 gm^{-2} for pathogens and nutsedge respectively, under low-permeability (LPBF) barrier films;

    - For nurseries, orchard replant and ornamentals: 15.0 or 17.5 gm^{-2} for pathogens and nutsedge respectively, under LPBF barrier films, except in cases where certification requires higher doses..

2. Virtually impermeable film (VIF) has to be used for sufficient time, or other techniques ensuring at least the same level of environmental protection.

3. Methyl bromide must be applied to the minimum area possible by, for example, using a strip application (see definition 19) wherever feasible. Where a strip application is considered feasible, the quantity nominated or licensed should be the proportionally reduced amount (33% less compared to full area treatment)[70].

4. Methyl bromide must be applied using the injection method (see definition 20) where feasible, rather than using the hot gas. Where the injection application

69 TEAP (2007) Evaluation of 2007 critical use nominations for methyl bromide and related matters, August 2007, UNEP Nairobi, p.65.

70 Handbook on Critical Use Nominations for Methyl Bromide, 2005.

is considered feasible, the quantity nominated or licensed should be the proportionally reduced amount (33% – 57% less than when hot gas was used).

5. The frequency of methyl bromide applied to the soil must be reduced, where feasible, to one year in two, three or longer. Strip application may be more difficult when the frequency of application is reduced, except where an alternative treatment can control the target pests in rotation with the MB-treatment.

6. Fumigations shall continue to be permitted only on the basis of prior approval to the fumigator.

7. Monitoring of pests and diseases encourages methyl bromide to be used only when strictly necessary and offers the potential to significantly reduce methyl bromide use and emissions.

8. Fumigation using methyl bromide from disposable cans is banned under paragraph 4 of Article 16 in Regulation (EC) No 2037/2000.

Few techniques can reduce methyl bromide leakage as effectively as VIF. For example, MBTOC (2002) estimates that deep soil injection (60 cm) without coverage of the soil gives greater emissions of methyl bromide than soil treatment using VIF. Article 17 in Regulation (EC) No 2037/2000 required the use of "all precautionary measures practicable" to prevent and minimize leakages of methyl bromide, which included consideration of the following measures:

- Limiting the frequency of methyl bromide fumigation to once every 12 – 60 months. Reductions of methyl bromide by more than 75% are feasible when other methods of pest control are used in the interval between methyl bromide fumigations. .
- Monitoring/identifying key pests present in soil/commodities prior to any use of MB as this can result in significantly reducing its use by 80 – 90%;
- In conjunction with monitoring, permitting or authorising methyl bromide prior to each use and only when its use is strictly necessary. This system was used in the Netherlands in the 1980s and in Belgium in 2005. Methyl bromide should only be permitted when no alternative is available;
- Reducing doses of methyl bromide by combining it with other treatments such as other fumigants and non-chemical methods such as grafted plants and solarisation. The dose should not exceed the national limit and, when the national amount is higher than necessary, it should be reduced to the minimum known to control the pest. Spain introduced maximum limits on methyl bromide doses in 1998 and Italy in 1994;
- Applying methyl bromide by soil injection rather than hot gas using registered formulations that are diluted with PIC. Spain, for example, made substantial MB reductions by changing to MB:PIC 50:50 and recently introducing 33:67 for strawberry fruit.

5.3.2 Post-harvest Treatments

To limit the use and subsequent emissions of methyl bromide from post-harvest treatments, the following criteria were applied to determine the quantity of methyl eligible:

1. A dose of 20 gm^{-2} is the maximum recommended dose. The use of accurate measuring equipment to weigh methyl bromide avoids excessive use;
2. The EPPO standard dose is the maximum permitted for bulk commodities;
3. Good levels of gas tightness (see definition 22) achieved by effective sealing of the facility. Improvements to control leaks will also facilitate the use of alternative gases;
4. Raised temperature and increased time, where possible, in order to reduce the dose;
5. Effective air circulation to promote pest control in areas of the facility that are difficult to reach during MB fumigation;
6. Continuous monitoring (see definition 21) during MB fumigation to prevent over dosing);
7. Higher doses may be used in practice provided that the total quantity of MB used in each use-category does not exceed the minimal quantity licensed for each use-category.

Combining methyl bromide with carbon dioxide, phosphine and/or heat reduces the amount of methyl bromide required. Sansone (1994) reported the "MAKR"[71] structural fumigation treatment, which applies methyl bromide with carbon dioxide, uses 67% less methyl bromide than when it is used alone.

Worldwide there are very few facilities that have the operational capability to capture methyl bromide that would otherwise be vented to the environment after fumigation. Even when such equipment is in place, it can only capture the methyl bromide that remains free in the fumigation chamber or facility, as often a significant quantity remains in the wood, packaging, or the commodity, which is then slowly released to the environment weeks or months after fumigation. For this reason, capture equipment is not able to reduce methyl bromide emissions to zero or even very low levels. However, recapture technologies reduce MB emissions and are technically feasible for commodity fumigations and some structural fumigations.

5.4 Historical data on Methyl bromide use reduction trends

The graphs below describe historical trends in the area and tonnage of MB used in the EC for key crops in the period 1991-2009.

5.4.1 Cut flowers

In the past MB was used widely for cut flower production in many parts of the EC. Figure 5.2 shows the results of an analysis of the historical MB-treated area (hectares) for cut flowers in the EC until 2009, indicating a sharp decline particularly since

[71] Trademark of Integrated Environments Ltd. MAKR is registered in California, Texas and Florida.

Figure 5.2: Area treated with methyl bromide for cut-flower production in the EC

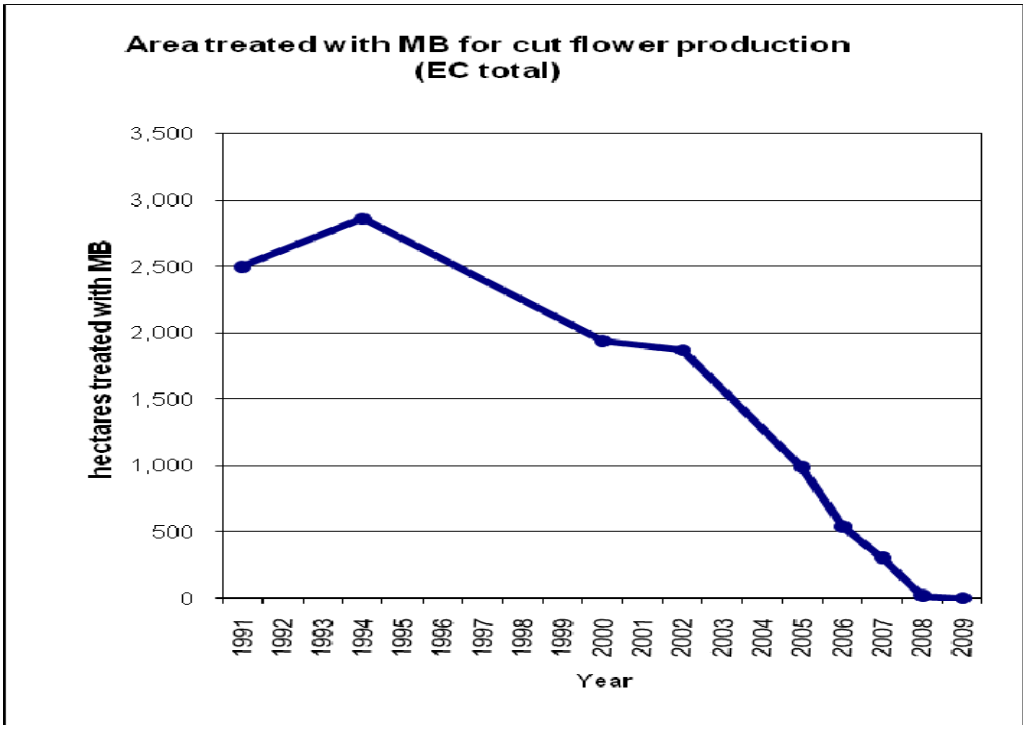
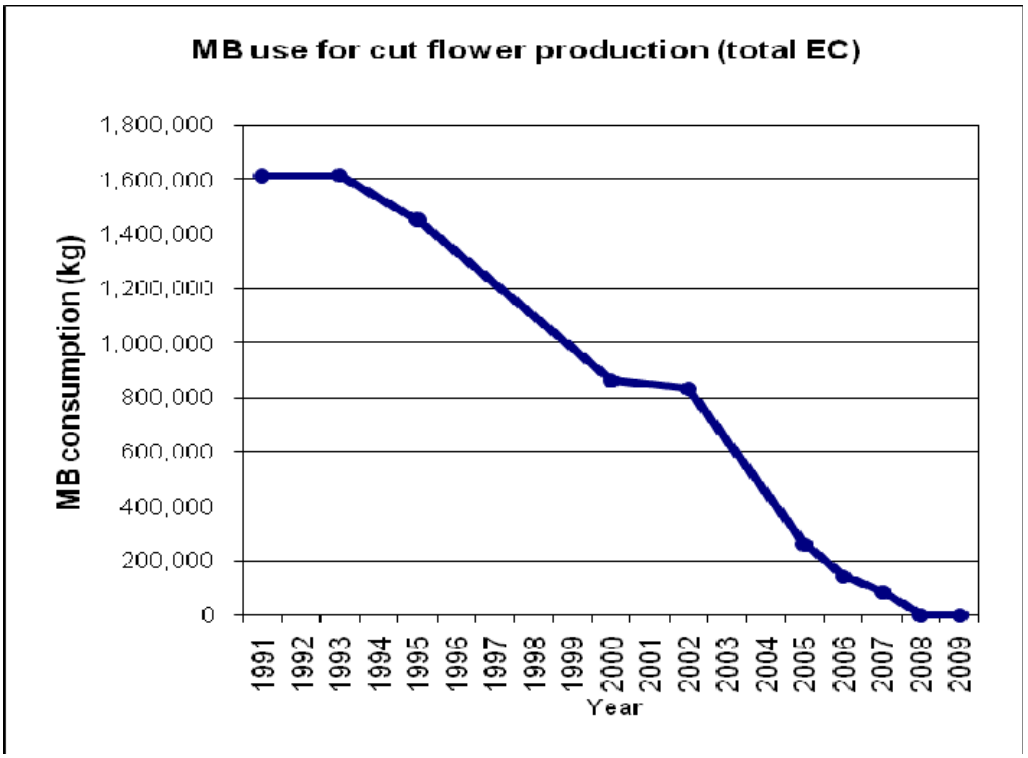


Figure 5.3: Methyl bromide consumption for cut flower production in the EC

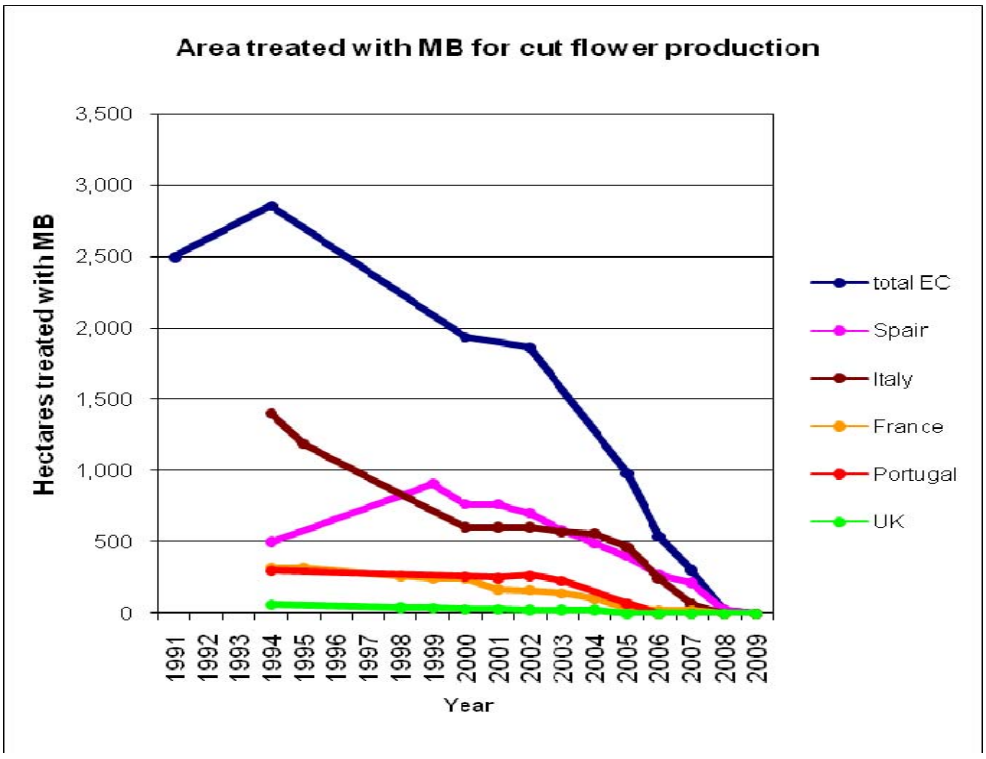


2002. In the subsequent graph, Figure 5.3 shows the results of an analysis of trends in MB use (kg) over the same period.

Early in 2006 it was estimated that, in the best case scenario, namely in the event the trend and reductions remain of a similar magnitude in the next years, the phase out of MB use for the production of cut flowers within the EC would occur in 2007/2008. In 2007, the amount used for cut flowers was 61,550 kg MB within the EC (France, Italy, Spain). Although there was one nomination for MB CUE for cut flowers in Spain in 2008, Spain pledged to completely phase-out this use by the end of 2008 and the authorised CUE in 2008 was for research purposes only. As such, the 2006 estimation of a total replacement of MB in cut flowers by 2008 remained accurate. MB use ceased in this sector at the end of 2008.

As an illustration of progress to 2009 in individual Member States, Figure 5.4 presents the area treated with MB for cut-flower production in the MSs that applied for CUEs.. The data indicate that some MSs made rapid reductions, while others experienced more difficulties in achieving faster reductions. Italy, for example, since 2003 achieved faster MB reductions in this crop than other Member States.

Figure 5.4: Area treated with methyl bromide for cut-flower production in key Member States that have had critical uses



5.4.2 Peppers

In the past MB was widely used for pepper production in the EC. There was a steep decline in the MB-treated area from about 2001. Figure 5.5 shows the historical trend in MB-treated area (hectares) for peppers in the EC. Early in 2006 it was estimated that, in the best case scenario, namely if the recent trend continued over the next

years, the phase out of the MB-treated area used for the production of peppers would occur before 2008. With 49,400 kg MB used for peppers within the EC in 2007, and no nominations for MB CUEs in 2008[72], MB phase out for commercial pepper production was indeed completed by the end of 2007.

Figure 5.5: Area treated with methyl bromide for pepper production in the EC

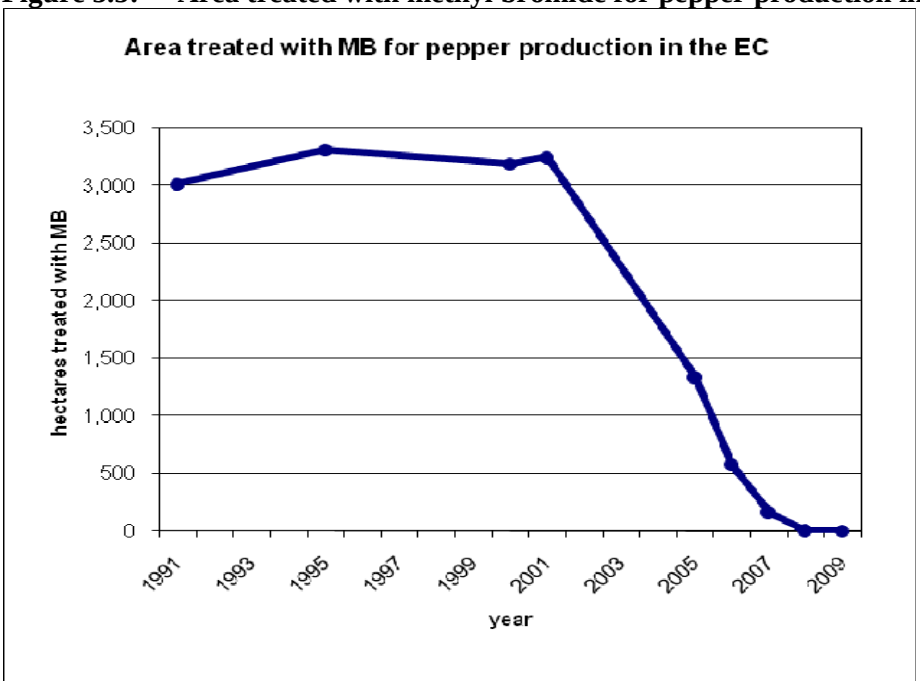
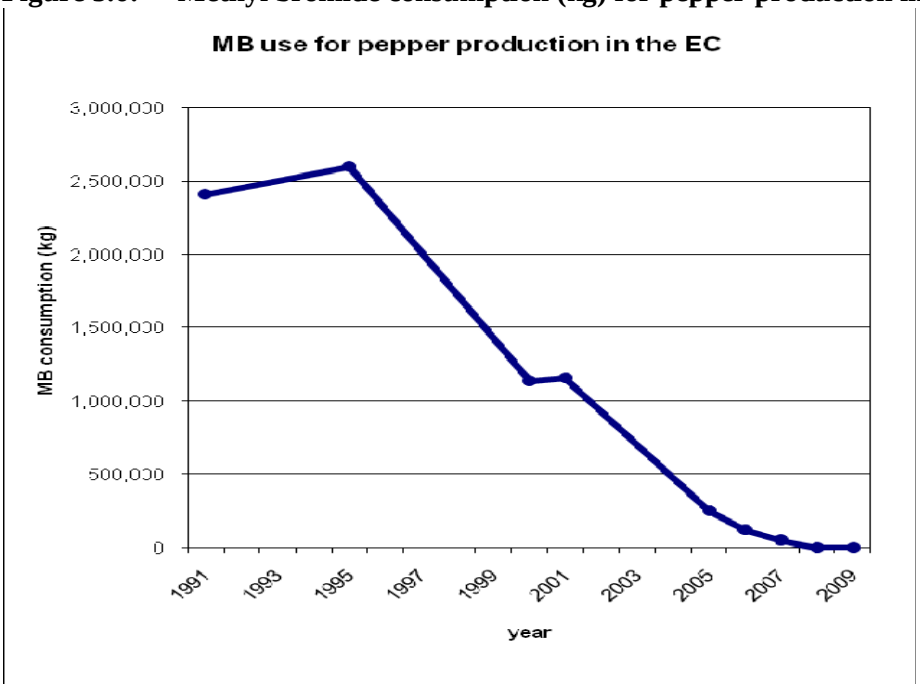


Figure 5.6: Methyl bromide consumption (kg) for pepper production in the EC

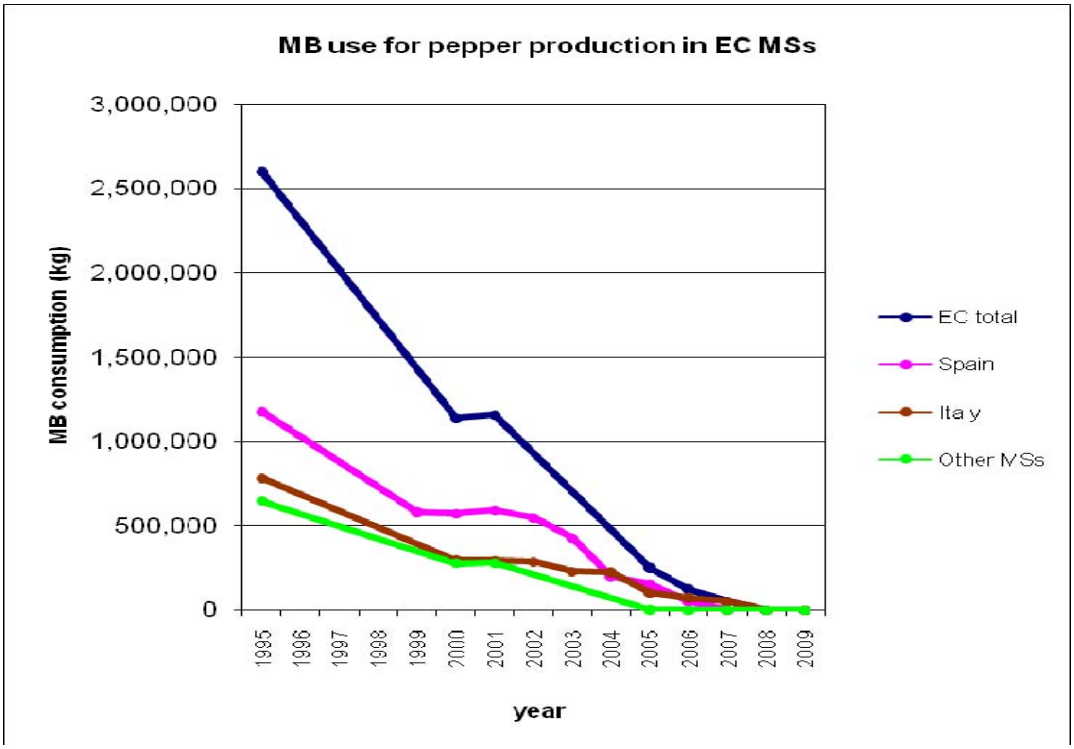


72 With the exception of a small amount for research in Spain.

Figure 5.6 shows the trend in MB use for peppers in the EC until 2009. The pattern of MB reductions differs between Figure 5.5 and 5.6 because many of the MB reductions in the period 1995 to 2001 resulted from the adoption of lower MB doses and mixtures of MB/PIC in this crop. The MB-treated area started falling from 2001 when the MB-dependent regions started to adopt alternatives.

Figure 5.7 shows the historical trend until 2009 in MB consumption (kg) for peppers in the EC and MSs that have had CUEs. The angle of slope varies between MSs. It is notable that Spain, once the largest single user of MB for this crop, by 2006 reduced MB to lower levels than another leading Member State. In 2007, Spain no longer relied on MB for commercial pepper production as its CUE of 70 kg was only for research purposes. No nominations were received for pepper crops in 2008, with the exception of a small amount only for research in Spain, and phase-out was completed by the end of 2008 in this sector.

Figure 5.7: Methyl bromide consumption (kg) for pepper production in MSs



5.4.3 Strawberry fruit

Figure 5.8 shows the MB-treated area for strawberry fruit from 1993 to 2009 in the EC, indicating the largest users. The curves show an increase in treated area in parts of the EC until 2003. The recent decline in the use of MB for strawberry fruit is mostly due to reductions in Spain and Italy and to a lesser extent by France and the UK. In 2007, besides a nominal amount of 50 kg MB CUE authorised for research

purposes in Spain, MB was no longer used for strawberry fruit in the EC, a result of good effort in adoption of MB alternatives in all MSs concerned.

Figure 5.8: Area treated with MB for strawberry fruit production in MSs

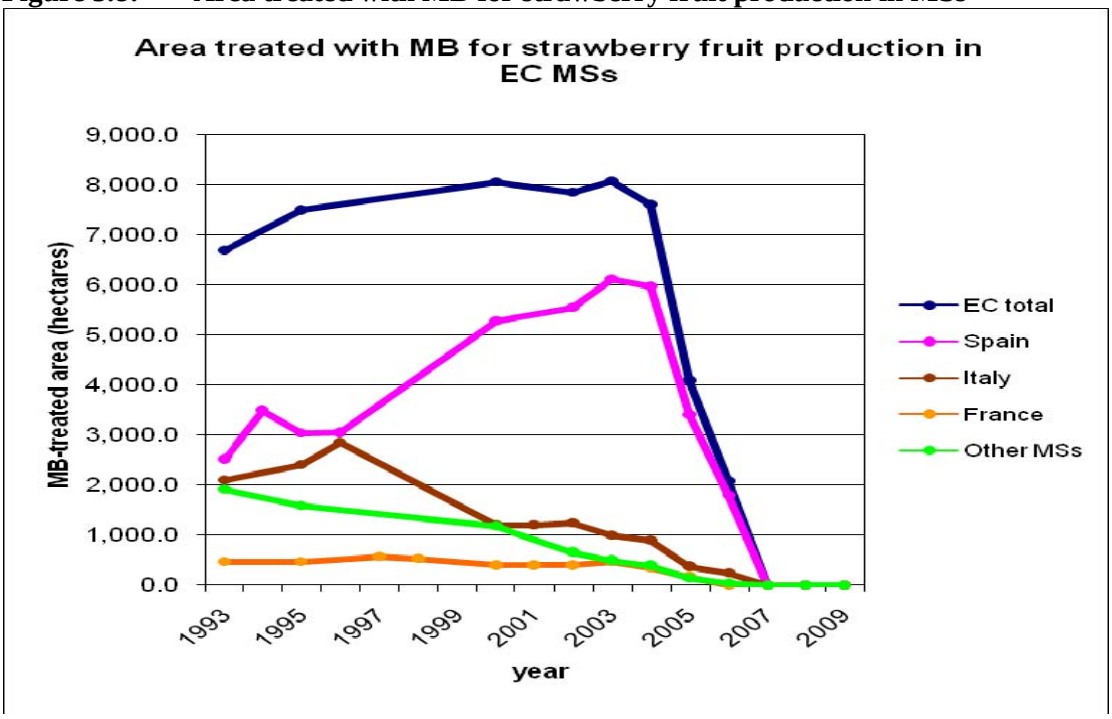
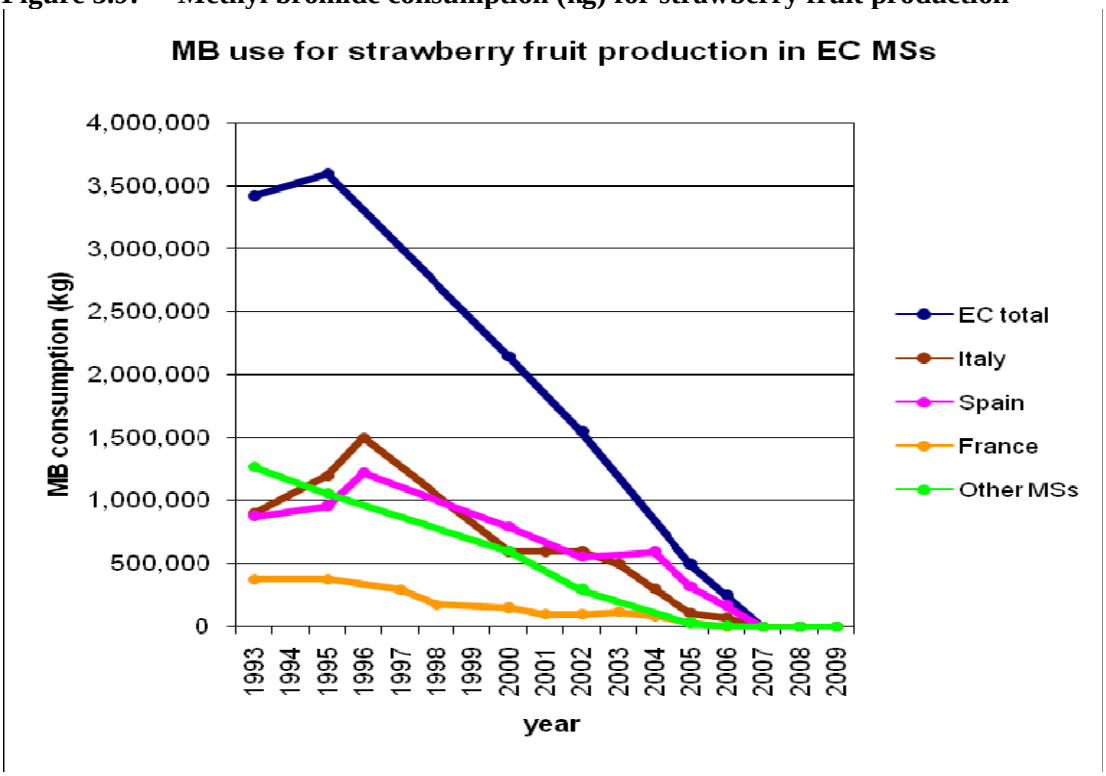


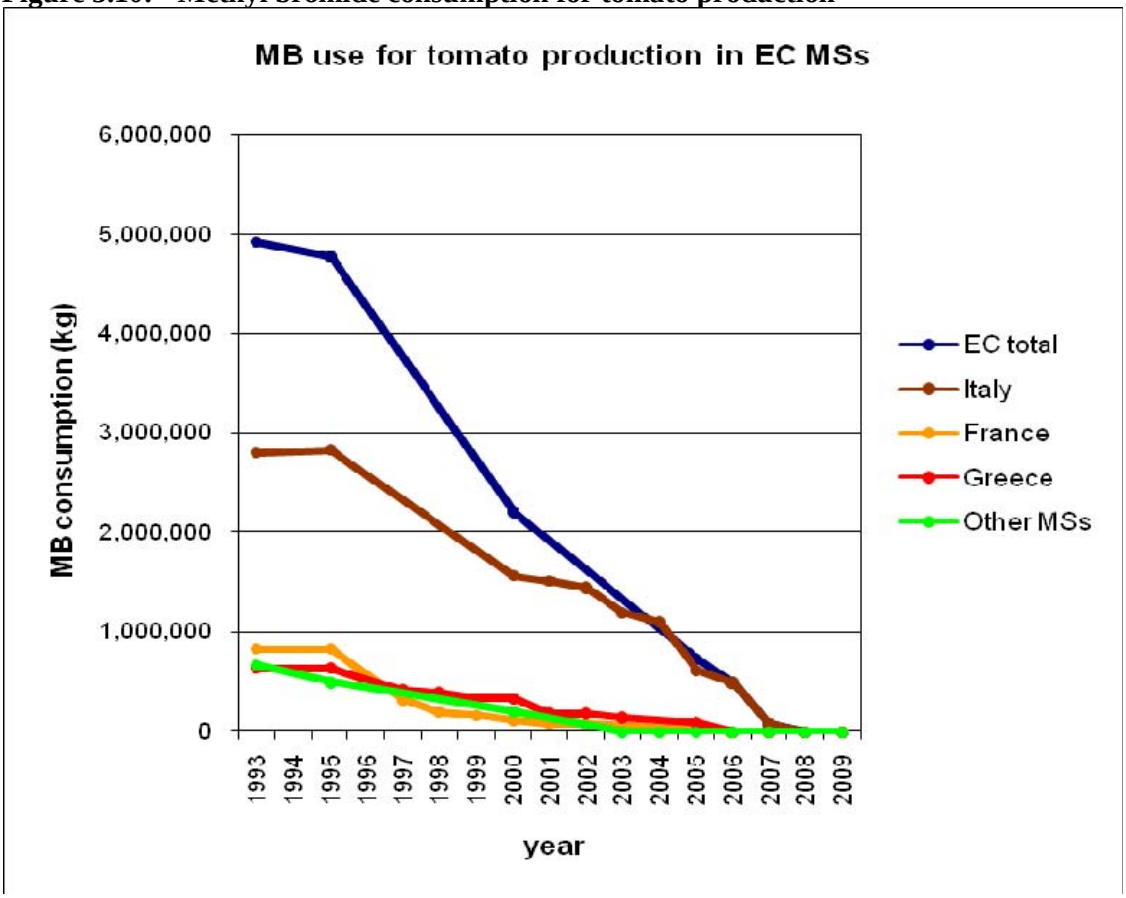
Figure 5.9: Methyl bromide consumption (kg) for strawberry fruit production



5.4.4. Tomato

Figure 5.10 presents historical data until 2009 on MB consumption for tomato in the EC and MSs that have had CUEs. Italy historically was the largest MB consumer in this crop. Very substantial MB reductions were achieved throughout the EC between 1995 and 2005 and, by the end of 2006, all but one MS eliminated MB in tomato production. MB phase-out in this sector was completed by the end of 2007.

Figure 5.10: Methyl bromide consumption for tomato production



5.4.5 Strawberry runners

Figures 5.11 and 5.12 present data from 1995 to 2009 on MB consumption for strawberry runners in the key MSs that have had CUEs. Spain continued to be the largest MB consumer in this crop, although progress was made in reducing the MB dose to 150 kg/ha (50:50 MB/PIC). Although substantial MB reductions were achieved throughout the EC in recent years, the area of strawberry runner production using MB continued to grow in one region. Nominations for CUEs were not put forward for 2009 in this sector, and phase out was completed by the end of 2008.

Figure 5.11: Methyl bromide consumption for strawberry runner production in MSs

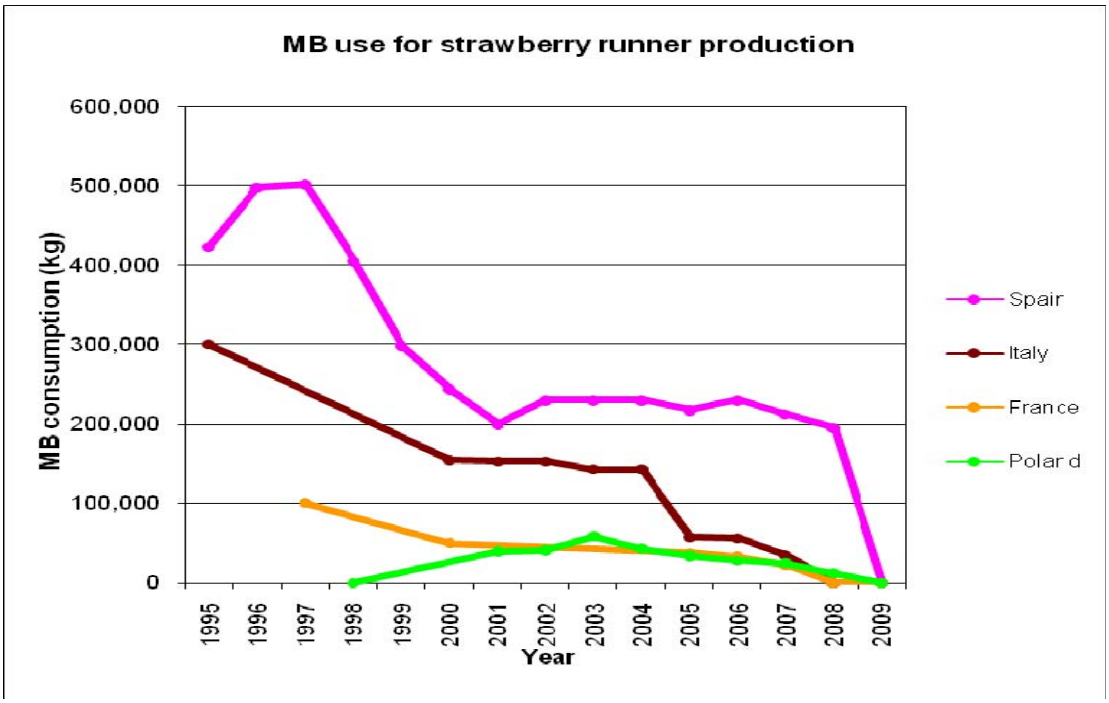
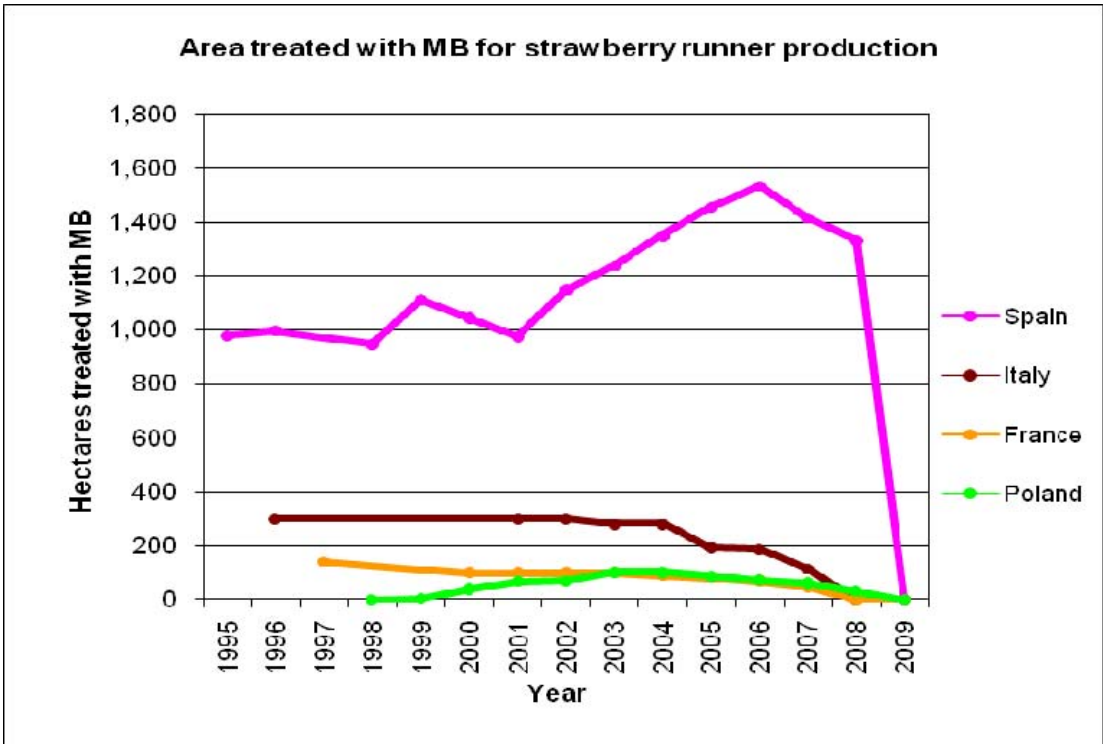


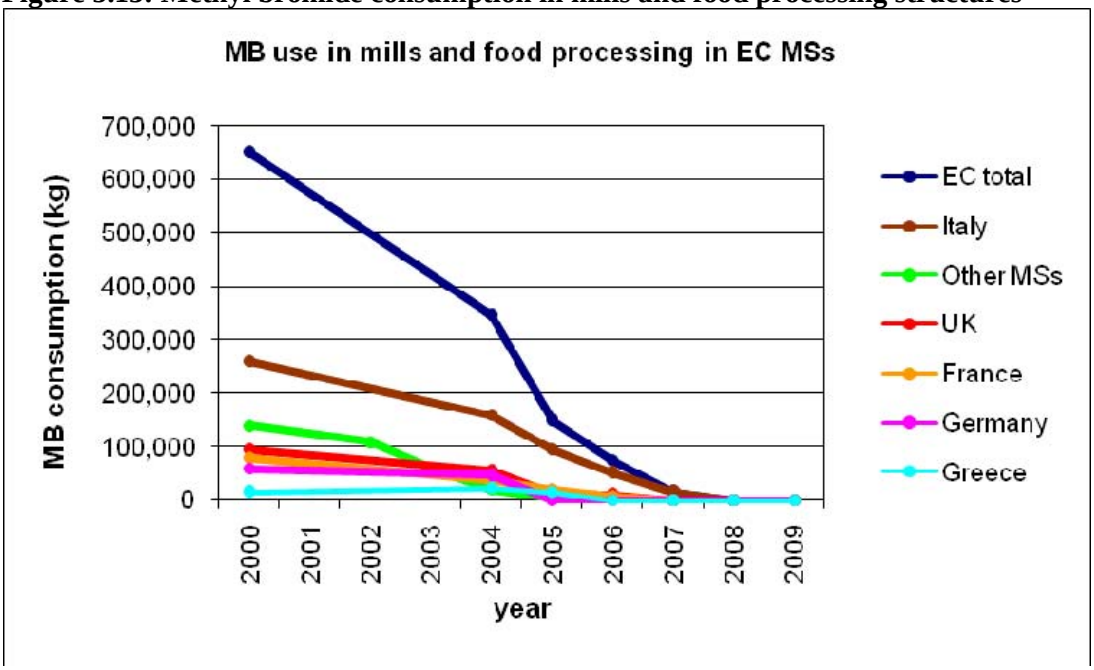
Figure 5.12: Area treated with MB for strawberry runner production in MSs



5.4.6. Mills and food processing structures

Figure 5.13 shows the trend in MB consumption in the EC from 2000 to 2009. CUEs were not authorised for 2008 and no nominations were received for this sector for 2009.

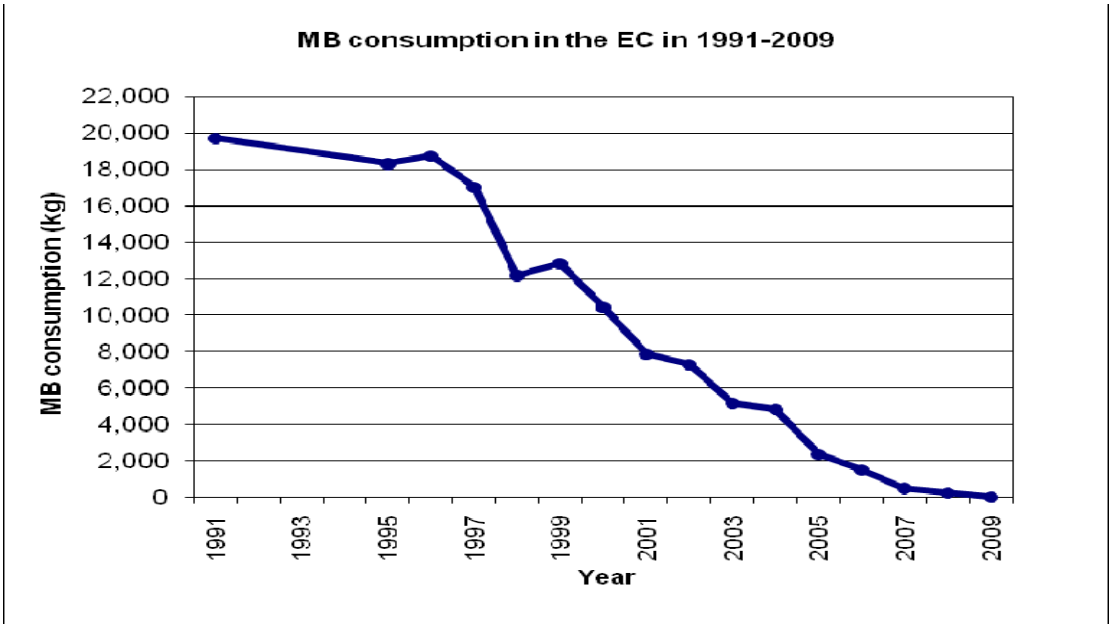
Figure 5.13: Methyl bromide consumption in mills and food processing structures



5.4.7. Total methyl bromide use in European Community

Figure 5.14 shows the total MB consumption in the EC from 1991 to 2009

Figure 5.14: Total MB consumption in the European Community since 1991



5.5 Methyl bromide use reduction trends, based on historical rates of adoption of MB alternatives

Table 5.3 provides information on the six major CUE use-categories authorised in 2006/7: tomato, strawberry fruit, cut flowers, pepper, strawberry runners, mills and food processing structures. As background information, it indicated the very substantial quantities of MB that have been eliminated to date in the EC. In the past > 4980 tonnes MB was used for tomato in more than 12 Member States. By 2005 this was reduced to 734 tonnes in 4 MSs; in 2007 it was 79 tonnes in one MS and in 2008 this became zero. Similarly, 12 MSs consumed more than 3,400 tonnes of MB for strawberry fruit production in the past, but this was reduced to 265 tonnes in 2 MSs in 2006 and in 2007 there were no CUEs for commercial production of strawberry fruit.

The analysis in Table 5.3 summarised a "best case scenario" of adoption rates of different types of alternatives and crops (hectares per year in individual Member States), based on actual examples of rates of adoption achieved in EC MSs previously (Table 4.3 and Annex 7.A). Alternative fumigants have been adopted at the rate of up to 1193 ha/year/MS for tomato, and up to 2090 ha/year/MS for strawberry fruit production, for example (Table 4.3). The final column of Table 5.3 summarised the relevant rates of adoption in key crops. This information was used in 2006 to calculate the adoption time expected for the remaining MB use-categories at that time.

Table 5.3. Methyl bromide reduction trends, based on historical rates of adoption in the EC (refer to Table 4.3 and Annex 7A)

Major MB CUEs in 2006	1991 est. MB use[73] (tonnes) (ha) (No. MSs)	2005 MB use[74] (tonnes) (ha) (No. MSs)	2008 MB quota[75] (tonnes) (ha) (No. MSs)	Existing MB alternatives[76]	Historical rates of adoption in individual MSs from Table 4.3, Annex 7.A (ha/year per MS)	Feasible adoption rates (derived from historical rates) and current status of CUEs
Tomato	> 4980 t > 7000 ha > 12 MS	734 t 2423 ha 4 MS	0 t 0 ha 0 MS	Fumigants: 1,3-D, PIC, metam sodium, dazomet	up to 1193 ha/year/MS	Rate of up to 1193 + 1570 = 2763 ha/year/MS Adoption completed by end of 2007
				Grafting on resistant root stock	up to 1000 ha/year/MS	
				Substrates	up to 1570 ha/year/MS	
Strawberry fruit	~ 3420 t ~ 5200 ha (>8000 ha in yr 2000) > 12 MS	497 t 3879 ha 4 MS	0 t 0 ha 0 MS	Fumigants: 1,3-D, PIC, metam sodium, dazomet	up to 2090 ha/year/MS	Rate of up to 2090 + 80 = 2170 ha/year/MS. Adoption completed for commercial strawberry fruit production by end of 2006
				Substrates	up to 80 ha / year/MS	
				Resistant varieties	no data	
Cut flowers	~ 1610 t ~ 1,800 ha > 12 MS	259 t 855 ha 6 MS	0 t 0 ha 0 MS	Fumigants: 1,3-D, PIC, metam Sodium, dazomet	up to 313 ha/year/MS	Rate of up to 313 + 60 + 917 = 1290 ha/year/MS Adoption completed for commercial cut flower production by end of 2007
				Substrates	up to 60 ha/year/MS	
				Steam	up to 917 ha/year/MS	
				Resistant varieties	??	
Peppers	~ 2410 t ~ 3,000 ha	250 t 1336 ha	0 t[77] 0 ha	Fumigants: 1,3-D, metam sodium, dazomet	up to 667 ha/year/MS	Rate of up to 667 + 175 = 842 ha/year/MS

[73] Refer to Section 3 for data.

[74] MB use data from EC Accounting Framework Report. Hectares calculated on doses stated in CUNs and CUNAs. If not stated, estimated based on mean dosage of MB for this use (tomato: 300 kg/ha; strawberry runners: 300 – 470 kg/ha; strawberry fruit: 100 – 300 kg/ha; cut flowers: 200 – 500 kg/ha; peppers: 150 – 300 kg/ha; mills and food processors: 20 g/m^3)

[75] Excluding 151 kg for research on strawberry fruit and peppers, and 25 kg for research on cut flowers in Spain in 2008.

[76] Further details and alternatives in Annex 4.C.

Major MB CUEs in 2006	1991 est. MB use[73] (tonnes) (ha) (No. MSs)	2005 MB use[74] (tonnes) (ha) (No. MSs)	2008 MB quota[75] (tonnes) (ha) (No. MSs)	Existing MB alternatives[76]	Historical rates of adoption in individual MSs from Table 4.3, Annex 7.A (ha/year per MS)	Feasible adoption rates (derived from historical rates) and current status of CUEs
	> 11 MS	3 MS	0 MS	Substrates	175 ha / year/MS	Adoption completed for commercial pepper production by end of 2007
Strawberry runners	~ 740 t ~ 930 ha ~ 5 MS	346 t ~ 1500 ha 4 MS	212 t 1364 ha 2 MS	Fumigants: 1,3-D, PIC, metam sodium, dazomet	up to 94 ha/year/MS	Rate of up to 94 + ? ha/year/MS
				Plug plants	??	Adoption of alternatives completed by end of 2008
Mills and food processing structures	640t 12,800,000 m3 [78] ~ 15 MS	150 t ~7,500,000 m3 [79] 5 MS	0 t 0 m^3 0 MS	Heat + IPM	up to 3,500,000 – 4,600,000 m^3 / year/ MS	Rate of up to 3.5 to 4.6 + 0.2 + ?? million m^3/year/MS
				Sulfuryl fluoride (+ heat)		
				Phosphine (+ heat)	??	
				Modified atmosphere (structures)	200.000 m^3 / year	Adoption completed by end of 2007
Coffee beans	Modest use. No data	< 1.6 t <172,800 m^3 1 MS	0.5 t 54,000 m^3 1 MS	Phosphine solid formulations + heat if necessary	??	46,400 + ?? m^3/year/MS
				Phosphine gas generation	??	Adoption rate slower than expected. Adoption completed by end of 2008
				Vacuum-hermetic treatment	??	
				Controlled atmosphere + heat if necessary	??	
				High pressure + CO2	46,400 m^3/year	

[77] Excluding 151 kg for research on strawberry fruit and peppers in Spain in 2008.
[78] Assuming average dose was about 50 g/m^3 in 1991.
[79] Assuming dose of about 20 g/m^3

5.6 Other actions to support methyl bromide phase-out

The EC made considerable progress in adopting diverse types of alternatives and in eliminating CUEs, as described in previous chapters. The phase-out of critical uses was completed by the end of 2008, and the EC did not submit critical use nominations for 2009 and 2010.

For all methyl bromide critical uses, one or more alternatives are available and the main factor that limited its elimination was the rate at which alternatives could be adopted. In such cases, the time to eliminate methyl bromide was related to the time that would be necessary for methyl bromide users to adopt the 'best available' alternative, based on a consideration of:

- The time remaining to complete the registration of an alternative, if necessary (for example if a non-chemical method is not technically feasible in the specific situation);
- The time for companies and technicians (in the MS and/or other Parties) to supply equipment, materials and know-how; and
- The number of PCOs/applicators that supply or use this alternative at present in the MS, and the number of additional PCOs/applicators that would need to be trained as soon as possible. The time needed to train end-users may be relevant if they use the alternative rather than the PCOs/applicator.

Table 5.4 provides illustrations of specific technology transfer activities and related supporting activities relevant to MB phase-out.

Table 5.4 Specific technology transfer activities and supporting activities

Technology transfer activities	Examples of supporting activities
Awareness-raising and improved knowledge-system of MB users and end-users	• Information transfer at the practical level, including tailor-made information about MB alternatives for end-users, relevant to specific pests species and local circumstances (section 3.6) • Information sheets, fact sheets, information websites, regular newsletters (section 4.4.3) • Role of fumigators and PCOs in disseminating know-how to end-users (section 3.6) • Role for growers, PCOs, extension and research groups, supermarkets, companies that purchase farm products, consumers and credit suppliers (section 3.6) • Information exchange through workshops or conferences (section 4.4.3)
Improvements in pest management techniques	• Continued development of sustainable pest management techniques to meet current and future regulatory requirements (section 3.3, 3.5)

Technology transfer activities	Examples of supporting activities
Training in the use of MB alternatives	• Practical, illustrated step-by-step training manuals (section 4.4.3) • Technical training in MB alternatives organised by PCOs, agricultural institutes, companies, growers/millers associations, governments, etc. (section 4.3), particularly hands-on training sessions (section 4.4.3) • Demonstrations, field days, study visits, workshops (section 4.3.3)
Creation of conducive economic environment	• Taxes on MB imports, revenue used to promote alternatives (section 4.4.2) • Agricultural grants or bank loans to promote adoption of MB alternatives (section 4.4.2)
Restrictions on MB use	• Regulations limiting frequency of MB use (section 4.4.1) • De-registration of all uses of MB for which alternatives are not available (section 4.4.1) • Measures to prevent illegal trade in MB (section 4.4.1)
Market signals	• Agricultural production standards and certification systems that do not permit use of MB, such as MPS, GlobalGAP (formerly EUREP) cut flower standards, and COEXPHAL growers association production standard (section 4.4.2) • Supermarket specifications that do not allow use of MB (section 4.4.2)

6 Compliance by the European Community with Montreal Protocol Decisions on critical uses

6.1 EC fulfilment of Montreal Protocol obligations

The European Community has fulfilled its obligations relating to the use and phase out of the critical uses of methyl bromide in the Montreal Protocol.

Prior 1 January 2005, Regulation (EC) No 2037/2000 required initial MB reduction steps to be implemented earlier than required in the control measure described in Article 2H of the Montreal Protocol. Some reduction steps were also greater than required in that control measure. As a result, methyl bromide consumption in the EC was reduced substantially each year from 1998 (Figure 2.1).

Based on review procedures implemented by the European Community, the quantity of methyl bromide for CUEs has been reduced substantially from year to year, as summarised in Table 6.1. The quantity initially nominated for 2005 and 2008, for example, was respectively 30% and 1 % of 1991 base level, the quantity approved by the Protocol was 23% and 1%, while the allocation of quotas (for potential licensing) was 14% and 1%. The quantity finally used for CUEs in 2005 was 13% of the EC-12 base level, and 1% in 2008 (Table 6.1). No critical use nominations were submitted for 2009 and 2010. The EC phase-out of critical uses was completed in 2008.

Table 6.1 Summary of trend in critical uses in the EC, as percentage of Ozone Secretariat Baseline[80]

Critical uses	2005	2006	2007	2008	2009
Nominated to MOP	30 %	22 %	7 %	1 %	0 %
Authorised by MOP	23 %	18 %	4 %	1 %	0%
Allocation of quotas in EC	14 %	9 %	3 %	1 %	0%
Quantity MB used	13 %	8 %	3 %	1%	0%

In fulfilment of its obligations, the European Community has submitted the following information to the Montreal Protocol:

1. Alternatives database (updated annually) which listed alternatives according to their pre- and post-harvest uses (pursuant to paragraphs 1 & 2 of Decision Ex.I/4);

2. The 2005, 2006, 2007 and 2008 Accounting Framework Reports detailing the quantities of methyl bromide authorised, produced, imported, consumed, destroyed and the amount remaining at the end of the year (pursuant to paragraph 9(f) of Decision Ex.I/4);

3. A description of the application of the criteria in paragraph 1 of Decision IX/6 used to license critical uses (pursuant to paragraph 4 of Decision XVI/2, and paragraph 5 of Decision XVII/9);

4. A summary of each application that described the quantity of methyl bromide requested and the reasons that methyl bromide was considered critical (pursuant to paragraph 7 of Decision Ex.I/4); and

5. A management strategy for the phase-out of CUEs (pursuant to Decision Ex.I4(3), Decision XIX/9(12) and Decision XX/5(12)), which has been updated for each year that CUEs were authorised.

Member States have compiled information on the impact of the transition effort and activities carried out, and the EC has submitted Critical Use Exemption Reports to the Ozone Secretariat pursuant to paragraph 9(g) of Decision Ex.I/4.

[80] Baseline of 19,217 tonnes as stated in the Ozone Secretariat database. This Baseline was the EC-12 consumption in 1991. Further details are shown in Table 2.1.

In addition, paragraph 9 of Decision XVII/9 requires each Party to ensure that the Management Strategy for the phase out of the critical uses of methyl bromide addresses the aims specified in paragraph 3 of Decision Ex.I/4, namely that the Strategy aims to:

- Avoid increases in methyl bromide consumption even for unforeseen circumstances;
- Encourage the use of alternatives through the use of expedited procedures to develop, register and deploy technically and economically feasible alternatives;
- Bring forward the time when methyl bromide consumption for each use can be reduced and/or ultimately eliminated, based on information such as the potential market penetration of alternatives;
- Promote the implementation of measures which ensure that any use and emissions of methyl bromide are minimised (in cases where an exemption is authorised); and
- To show how the Strategy will be implemented to promote the phase-out of the uses of methyl bromide as soon as technically and economically feasible alternatives are available, taking into consideration the particular circumstances of the nomination.

These measures are summarised in the sections below.

Decisions XIX/9(12) and XX/5(12) require each party to continue to ensure that its management strategy for the phase-out of CUEs addresses the aims in Decision Ex.I/4(3). Accordingly, the EC updated the ECMS annually until the phase out was completed.

6.2 Measures to avoid increases in methyl bromide consumption

The ECMS has described procedures to avoid increases in methyl bromide consumption. The ECMS required the following:

- Methyl bromide to be eliminated as soon as technically and economically feasible alternatives are available;
- No increase in methyl bromide compared to the previous year that methyl bromide was used, unless exceptional circumstances arise, such as unexpected deregistration of an alternative where no other suitable alternative is available. The eligibility of the use is assessed using the Decision Tree based on the criteria contained in the EC Regulation and relevant Decisions described in Section 5. Uses should not be authorised in cases where similar enterprises use alternatives in the same circumstances and sell to the same markets as methyl bromide users;
- Any increase in crop area or production is to be achieved with the use of alternatives, whenever feasible;

- Methyl bromide to be used only as a 'last resort' when an alternative is not available in the circumstances of the nomination;
- Use and emission reduction practices (Section 5.4) to be implemented.

6.3 Measures to encourage the use of alternatives

The ECMS described procedures to encourage the use of alternatives, such as:

- Expedited procedures in cases where further alternatives need to be developed (Chapter 4), in particular for products that have lower toxicity than traditional chemicals (Section 4.2.4);
- Methyl bromide was permitted only in cases where the applicant demonstrated that appropriate programmes are in place to develop alternatives (Figure 5.1 and definition 12 in Table 5.2);
- Expedited procedures to deploy technically and economically feasible alternatives to MB (Chapter 5). Methyl bromide was permitted only in cases where the applicant demonstrated that appropriate plans are in place to deploy alternatives (as described in Table 5.2);
- Procedures for assessing the eligibility of methyl bromide for critical uses based on the minimum time necessary to deploy alternatives, the number of weeks needed for purchasing products/equipment, and other necessary measures, with the intention of completely phasing out methyl bromide as soon as technically and economically feasible alternatives were available (Table 4.3, and Chapter 5).

6.4 Measures to bring forward the time when each MB use can be eliminated

The ECMS described procedures that brought forward the time when methyl bromide consumption for each use could be ultimately eliminated, based on information such as potential market penetration of alternatives and other relevant information. Section 4.3 provided examples of the historical rates of adoption of alternatives. Chapter 5 outlines conditions and principles used to assess the eligibility of any exemptions of MB for CU and provides illustrations of specific technology transfer activities and supporting activities.

6.5 Measures to ensure that any use and emissions of MB are minimised

Section 5.4 described the procedures to ensure that any use and emissions of methyl bromide were minimised (in cases where an exemption was authorised). Sections 5.4 and 5.5 contain detailed definitions of measures intended to minimise leakage of methyl bromide.

6.6 Measures to phase-out uses of MB as soon as technically and economically feasible alternatives are available

The ECMS described the actions taken to phase out methyl bromide as soon as technically and economically feasible alternatives were available.

The review carried out by the EC prior to licensing of any critical uses of methyl bromide, following earlier assessment by MBTOC, provided an important opportunity to take account of the latest progress made in the availability in alternatives.

As a result of the activities summarised above, the phase-out of critical uses has now been completed in the EC.