

PRELIMINARY RESULTS OF AN INTERNATIONAL SURVEY ON THE USE METHYL BROMIDE FOR QUARANTINE AND PRE-SHIPMENT

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ABSTRACT

An international survey was carried out to determine the volumes of methyl bromide (MB) that were used for quarantine and pre-shipment (QPS) purposes in 2002. Preliminary results are presented in this paper. Forty two Parties responded to the survey and reported that 1,611 tonnes of MB was used for QPS. Of this, just over half was used to treat cereals, grains and dried foodstuffs and a further 28% to treat wood packaging, wood and logs. Parties reported widespread availability of alternative treatments, but that cost, location of facilities, and lack of acceptance by trading partners are impediments to their implementation. Although the survey represents a small sample of estimated QPS MB use, the survey has identified the main uses and those uses for which respondents report alternatives are available but not in use. The survey also identified a need for greater awareness of the scope and definition of the quarantine and pre-shipment exemption.

INTRODUCTION

Applications of methyl bromide (MB) for quarantine and pre-shipment (QPS) purposes are exempt from the phase-out provisions of the Montreal Protocol. Quarantine applications are treatments to prevent the introduction, establishment and/or spread of quarantine pests¹ (including diseases), or to ensure their official control². Pre-shipment applications are non-quarantine applications applied within 21 days prior to export to meet the official requirements³ of the importing country or existing official requirements of the exporting country.

The Eleventh Meeting of the Parties to the Montreal Protocol instructed the Technical and Economic Assessment Panel (TEAP) “to estimate the volume of methyl bromide that would be replaced by the implementation of technically and economically feasible alternatives for quarantine and pre-shipment, reported by commodity and/or application” (Decision XI/12). Due to TEAP workload and other priorities the report requested by the Parties could not be completed. Instead, an international survey on the use of MB for QPS purposes was commissioned to assist TEAP in this work. This paper presents preliminary results of the survey.

METHODS

In order to standardise data reporting a survey form was developed to gather data from the Parties. In the survey form the broad range of commodities and articles that might be treated with MB for QPS purposes were grouped under 16 headings: Bulbs, corms, tubers and rhizomes (intended for planting); Cut flowers and branches (including foliage); Fresh fruit and fresh vegetables; Grain and cereals for consumption including rice (not intended for planting); Dried foodstuffs (including herbs, nuts, dried fruit, coffee, cocoa); Nursery stock (plants intended for planting other than seed); Seeds (intended for planting); Wooden packaging materials, other packaging materials including cardboard, pallets and dunnage; Wood (including round sawn, sawn wood, wood chips); Whole logs (with or without bark); Hay, straw, dried animal fodder (other than grains and cereals listed above); Cotton and other fibre crops and products; Buildings (including dwellings, factories, storage facilities); Equipment (including used agricultural machinery & vehicles) and empty shipping containers; Personal effects, furniture, crafts, artefacts, hides, fur and skins; Other.

For each of these major groups, Parties were asked to identify the quantities of MB used for QPS, the reasons for treatment (associated pests, legislative basis for treatment) and the availability of alternative treatments in their country. The survey sought data for the 2002 calendar year as this is the most recent period for which Parties are required to have reported their total MB consumption (including total QPS) to the United Nations Environment Programme (UNEP). The survey form was made available for download from

¹ Pests of potential importance to the areas endangered thereby and not yet present there, or present but not widely distributed and being officially controlled.

² Control performed by, or authorized by, a national plant, animal or environmental protection or health authority.

³ Those which are performed by, or authorized by, a national plant, animal, environmental, health or stored product authority.

the website of the UNEP Ozone Secretariat from April. The Ozone Secretariat contacted all Parties to the Montreal Protocol and requested that they co-operate in the completion of the survey and that responses be received by 30 June 2004.

RESULTS OF THE SURVEY

Volume of methyl bromide used for quarantine and pre-shipment purposes in 2002

Forty two of the 188 Parties to the Montreal Protocol responded to the survey, reporting a total of 1,611,062 kg of MB used for QPS (Table 1). Fifteen of these respondents advised that their use of MB for QPS was zero in 2002 (Colombia¹, Cyprus^{1,3}, Czech Republic³, Denmark², Dominica¹, Luxembourg², Macedonia, Mongolia¹, Namibia¹, Oman¹, Slovakia³, Slovenia³, Sweden², Togo¹, Uganda¹). Twenty of the responding Parties operate under Article 5 of the Montreal Protocol, and 22 are non-Article 5 countries. Responding Article 5 countries used 76% of the total MB reported for QPS purposes. Several Parties at the Open-Ended Meeting of the Parties in July 2004 reported that more time was required to complete the survey (Anon, 2004).

TABLE 1: Volume (kg) of methyl bromide used by responding Parties for QPS purposes in 2002

Name of Party	Total MB (kg) for QPS use	MB (kg) replaceable by alternative technologies	Name of Party	Total MB (kg) for QPS use	MB (kg) replaceable by alternative technologies
Bahrain ¹	2,000	0	Myanmar ¹	61,373	61,373
Belarus	948	0	Netherlands ²	1,470	750
Belgium ²	25,660	25,660	New Zealand	100,100	0
Bulgaria	5,000	5,000	Nigeria ¹	300	0
Cameroon ¹	13,500	13,500	Pakistan ¹	31,000	0
Canada	18,958	8,495	Peru ¹	36	0
Egypt ¹	224,342	142,132	Poland ³	34,779	0
Estonia ³	100	100	Portugal ²	5,000	5,000
European Union ⁴	265,346	164,377	South Africa ¹	44,630	9,023
Greece ²	29,828	29,828	Spain ²	131,068	72,998
Hungary ³	3,000	3,000	Turkey ^{1,5}		
Italy ²	41	41	United Kingdom ²	34,400	27,000
Jamaica ¹	2,828	648	Uruguay ¹	600	431
Mexico ¹	284,200		Viet Nam ¹	555,900	457,300
Total Article 5 Parties	1,220,709	684,407	Notes		
Total non-Article 5 Parties	390,352	177,872	¹ Operating under Article 5 of the Montreal Protocol.		
			² Member State of the European Union in 2002.		
			³ Current EU Member State, but not a member in 2002.		
			⁴ Total of data submitted by current European Union Member States, including those Parties that were not Member States in 2002.		
			⁵ Some aspects of the data provided are currently being clarified so are not reported here.		
TOTAL	1,611,062	862,279			

Of the total volume of MB reported for QPS, approximately 75% was used for quarantine (Q) purposes and only 2.7% could be identified as pre-shipment (PS) use. The breakdown between Q and PS use was very similar when totals for Article 5 Parties (74% Q, 3% PS) and non-Article 5 Parties (77% Q, 3% PS) were calculated. The remaining percentages could not be accurately allocated to either category due to ambiguity in the data provided. These figures should be considered preliminary as some survey responses are being clarified with the responding Parties.

Major sectors using methyl bromide for quarantine and pre-shipment

Just over half of the MB used for QPS in 2002 (Table 2) was used to treat durable food products in the categories of grains and cereals (40.2%) and dried foodstuffs (11.5%). Responding Parties suggested that most of this use of MB (89% and 77% respectively, or 590.8 tonnes) could be replaced by the implementation of alternative technology that is currently available, but not used, in their countries.

The next largest category for QPS use of MB (28.0% or 371.7 tonnes) was for timber and timber products (wood packaging, sawn wood, whole logs), followed by cotton and fibre (6.5% or 86.2 tonnes), and perishable plant products (fresh fruit and vegetables and flowers) at 3.1% or 41.4 tonnes. The category of "other", the specifics of which were generally not detailed by Parties, represented 6.2% of QPS use.

TABLE 2. Quarantine and pre-shipment use of methyl bromide by use category, including quantities that could be replaced by the implementation of available alternative technology.

Category (categories are described fully in methods)	MB (kg)	% MB used by sector	MB (kg) for QPS replaceable by alternatives	% MB used for QPS replaceable by alternate technology
Bulbs, corms, tubers and rhizomes	3,035.50	0.23	0.00	0.00
Cut flowers and branches	2,731.30	0.21	2,010.00	73.59
Fresh fruit and fresh vegetables	38,682.95	2.92	16,046.75	41.48
Grain and cereals for consumption	533,479.55	40.21	473,214.00	88.70
Dried foodstuffs	152,440.14	11.49	117,575.00	77.13
Nursery stock	64.04	0.00	0.00	0.00
Seeds for planting	618.39	0.05	400.00	64.68
Wooden packaging materials, pallets, dunnage, other packaging	204,612.16	15.42	119,549.44	58.43
Wood	107,791.90	8.12	100,850.40	93.56
Whole logs	59,330.45	4.47	3,957.80	6.67
Hay, stray, dried animal fodder	2,345.00	0.18	0.00	0.00
Cotton and fibre	86,198.00	6.50	13,500.00	15.66
Buildings	0.00	0.00	0.00	0.00
Equipment	35,360.26	2.66	14,813.00	41.89
Personal effects	18,298.65	1.38	362.25	1.98
Other	81,873.50	6.17	0.00	0.00
TOTAL¹	1,326,861.79	100.00	862,278.64	64.99

¹ Note these totals differ from Table 1 totals, because some survey respondents did not allocate total MB into specific categories. Percentages in Table 2 are percentages MB allocated to categories.

Methyl bromide alternatives

Most Parties reported that MB alternatives were commercially available in their countries. The totals presented in Table 2 suggest that 65% of the MB currently used for QPS purposes could be replaced by technologies that are commercially available in the responding countries. Article 5 Parties estimated that 73% of QPS MB use could be replaced by alternative technologies and non-Article 5 parties reported that 46% could be replaced.

The volumes of MB that could be replaced by alternative technologies within each of the survey categories are presented in Table 2. Responding parties also identified the MB replacement technologies that were available in their countries. For grains, cereals, and dried foodstuffs the available alternatives included phosphine, aluminium phosphide, magnesium phosphide, hot water treatment, heat treatment, controlled atmosphere, and combination hot water and dry air. For timber and timber products alternatives were heat treatment, heat + low O₂, phosphine, aluminium phosphide, ethyl formate, sulfuryl fluoride, debarking, insecticides, pest free areas, and inspection. For cotton and fibre, the only alternative reported was phosphine. For perishable plant products alternatives included pyrethroids, cold treatment, hot water treatment, and alternative phytosanitary procedures (pre-clearance programmes, systems approach, pest free areas, inspection). Principle reasons why these alternatives have not been adopted are cost (relative to MB), location of heat treatment facilities, lack of application to packed shipping containers, and their lack of acceptance by importing countries.

Pests treated with methyl bromide for quarantine and pre-shipment purposes

For each of the major groups of commodities treated with MB for QPS, the pests that were treated are listed in Table 3, as are the export destination countries that required these treatments to be carried out. The species listed in Table 3 are those specified by responding parties, however many responses were non-specific (e.g., "various insects"). Similarly, the list of countries requiring MB treatment includes all of those countries listed by the responding parties, however in many cases only very general destinations were stated (e.g., "many countries", "Asia", "West Africa"). Some Parties expressed concerns that providing details of export destinations was commercially sensitive to some export sectors.

In addition to the export destinations, many QPS treatments were applied by importing countries in response to the detection of quarantine pests during import inspection. These importing countries are not listed in Table 3 as they do not require mandatory MB treatment – the treatments were only applied in response to the detection of specified quarantine pests.

TABLE 3. Key pests treated with methyl bromide for quarantine and pre-shipment purposes in major use categories, and the countries requiring this treatment (2002 data).

Category	Key pests treated	Countries requiring MB treatment for these commodities ¹
Grain, cereals & dried foodstuffs	<i>Acarus siro</i> , <i>Ahasverus advena</i> , <i>Araecerus fasciatus</i> , <i>Botrytis</i> spp., <i>Carpophilus dimidiatus</i> , <i>C. hemipterus</i> , <i>Curculio elephas</i> , <i>C. splendana</i> , <i>Cydia</i> sp., <i>Ephestia cautella</i> , <i>Ephestia figulilella</i> , <i>Ephestia kuehniella</i> , <i>Ephestia</i> spp., <i>Fusarium</i> spp., <i>Lasioderma serricorne</i> , <i>Lolium temulentum</i> , <i>Necrobia rufipes</i> , <i>Oryzaephilus surinamensis</i> , <i>Phoma</i> spp., <i>Plodia interpunctella</i> , <i>Ptinus</i> spp., <i>Rhyzopertha dominica</i> , <i>Sitophilus granarius</i> , <i>Sitophilus oryzae</i> , <i>Tilletia indica</i> , <i>Tribolium confusum</i> , <i>Tribolium</i> sp., <i>Trogoderma granarium</i> , <i>Trogoderma inclusum</i> , <i>Typhaea stercorea</i> , weed seeds, mites.	Angola, Bahrain, Bangladesh, Canada, China, European Union, Germany, India, Indonesia, Japan, Korea, Macau, Malaysia, Mexico, USA.
Timber products (packaging material, sawn timber, logs)	<i>Agrilus planipennis</i> , <i>Anobium rufipes</i> , <i>Anoplophora chinensis</i> , <i>Anoplophora glabripennis</i> , <i>Bursaphelenchus xylophilus</i> , <i>Callidium violaceum</i> , <i>Callipogon relictus</i> , <i>Erwinia salicis</i> , <i>Heterobostrychus</i> sp., <i>Hylastes ater</i> , <i>Ips typographus</i> , <i>Lyctus</i> sp., <i>Lymantria dispar</i> Asian biotype, <i>Lymantria monacha</i> , <i>Lymantria mathura</i> , <i>Monochamus alternatus</i> , <i>Monochamus</i> sp., <i>Ophiostoma ulmi</i> , <i>O. novo-ulmi</i> , <i>Phytophthora</i> sp., <i>Phytophthora ramorum</i> , <i>Ptilinus fuscus</i> , <i>Priobium carpini</i> , <i>Sirex noctilio</i> , <i>Tetropium castaneum</i> , <i>Tetropium fuscum</i> , <i>Tomiscus piniperda</i> , <i>Trichoferus campestris</i> , <i>Tyroglyphus farinae</i> , <i>Xanthomonas populi</i> , <i>Zeuzera pyrina</i> , Anobiidae, Bostrichidae, Buprestidae, Cerambycidae, Curculionidae, Isoptera, Lyctidae, Oedemeridae, Scolytidae, Siricidae, nematodes, wood boring insects, warehouse pests, white ants.	Australia, Brazil, Canada, Chile, China, Cuba, Egypt, Fiji, India, Iran, Ivory Coast, Netherlands, New Caledonia, Mexico, New Zealand, South Africa, Singapore, Spain, Tanzania, Turkey, USA.
Cotton & fibre	<i>Anthonomus grandis</i> .	European Union, Pakistan
Perishable plant products (fresh fruit & vegetables, cut flowers & branches)	<i>Anastrepha fraterculus</i> , <i>Artipus</i> sp., <i>Aspidiotus hartii</i> , <i>Brachycera</i> sp., <i>Ceratitis capitata</i> , <i>Contarinia</i> sp., <i>Cydia pomonella</i> , <i>Dyprssa ulula</i> , <i>Dysmicoccus neobrevipes</i> , <i>Eriosoma lanigerum</i> , <i>Lepidosaphes ulmi</i> , <i>Palaeopus costicollis</i> , <i>Panonychus ulmi</i> , <i>Planococcus lilacinus</i> , <i>Planococcus pacificus</i> , <i>Pseudococcus citri</i> , <i>Pyrausta</i> sp., <i>Quadraspidotus perniciosus</i> , <i>Tribolium</i> sp., Bruchidae, aphids, spider mites, thrips, whitefly.	Bahrain, Brazil, Dubai, Egypt, Japan, Jordan, USA, Yemen.

¹ As stated by survey respondents

DISCUSSION

The total amount of MB reported from this survey is approximately 15% of the QPS usage that was estimated for 2000 by MBTOC (2002). Unfortunately, some large users of MB have yet to respond to the survey, so the results need to be interpreted with caution. However there are some general themes worthy of note and which are consistent with the findings of other studies.

The major uses of MB for QPS are for treatment of durable commodities, such as grains, cereals and dried foodstuffs and wooden packaging materials, wood, and logs. Banks (2001) found that these uses were amongst the main QPS uses of MB in Australia in 2000. Similarly, MBTOC (2002) reported that the second

largest use of MB (including QPS) after soil fumigation was to treat durable commodities. Most parties reported that alternatives are commercially available for these major groups of durable commodities; however they are yet to be fully implemented. The main impediments to their adoption are cost, location of facilities, and lack of acceptance by trading partners.

Amongst the timber products treated for QPS, wooden packaging is a major area of MB usage. In 2002, an International Standard "Guidelines for Regulating Wood Packaging Material in International Trade" (FAO, 2002) was published. The purpose of the guideline is "to reduce the risk of introduction and/or spread of quarantine pests associated with wood packaging material (including dunnage)" (FAO, 2002) by requiring that such materials are treated before export and marked to indicate that they have been treated. The guideline currently approves only two treatments for this purpose – MB fumigation and heat treatment. Many countries have subsequently acted to harmonise their import requirements with the guideline and it is likely that use of MB for treatment of wood packaging materials will have increased since 2002.

Several responding parties appeared to be unaware of the scope of the exemption for QPS use of MB – 290 tonnes of MB were categorised as QPS when the notes and explanations that were provided by survey respondents indicated that the use was not QPS (e.g., fumigation of flour mills, golf courses and nurseries, requirement of letter of credit). Other Parties reported fumigating export consignments when unaware of the pests being treated or of importing country legislation requiring treatment with MB. Some of these treatments appeared to be prophylactic treatments aimed at ensuring smooth clearance of import inspection procedures, rather than to treat specific quarantine pests.

Although these preliminary results represent a small sample of QPS use of MB, the survey has identified the main uses of MB for QPS, has determined that much more MB could be replaced by the adoption of available alternatives, and that there needs to be greater awareness of the scope of the QPS exemption.

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ADDENDA

Subsequent to the presentation of this paper we have received further information and clarifications as follow:

- Italy has clarified that its use of MB for QPS was 41 tonnes, not 41kg as reported in Table 1.
- Turkey has clarified its figures, and confirm a total of 12.9 tonnes of MB for QPS
- Kazakhstan has reported the use of 1.58 tonnes of MB for QPS