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Phase-out of Methyl Bromide in Grain Storage in Indonesia

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Abstract: Indonesia has ratified the Montreal Protocol and its amendments. This ratification shows the Indonesian commitment to actively contribute to preserving the global environment particularly in the context of ozone layer protection. The wide use of methyl bromide as an Ozone-Depleting Substance (ODS) in grain storages in Indonesia must be phased-out. The Government of Indonesia through the Ministry of Environment has decided to phase-out the use of methyl bromide in grain storages/non Quarantine and Pre-Shipment (non-QPS) by the end of 2007. The program on the phase-out of the use of methyl bromide in grain storages was financially supported by the Multilateral Funds through the United Nations Industrial Development Organization (UNIDO) and was carried out from 2006 to 2007. The Indonesian Ministry of Environment coordinated the implementation of this program. The above-mentioned Ministry has appointed SEAMEO BIOTROP the Southeast Asian Regional Center for Tropical Biology as the National Implementation Institute (NII) to carry out the program for the phase-out. The subject of the program is "Preparation and Organization of the Training of Trainers and Workshop-Phase-Out of the Use of Methyl Bromide in Grain Storages in Indonesia". The activities covered seminars and training courses participated by staff involved in fumigation or pest management in grain storages in several provinces in Indonesia. The aim of conducting these activities were to improve their knowledge and skills in the field of phosphine fumigation and integrated storage pest management (IS-PM) as an alternative technology to replace methyl bromide in grain storages. The program on phase-out of the use of methyl bromide was terminated in December 2007. Starting January 1, 2008 the use of methyl bromide in grain storages in Indonesia is prohibited. The Ministry of Environment of the Republic of Indonesia has been monitoring the ex-users of methyl bromide in the non-QPS sector who have already replaced methyl bromide with phosphine and ISPM so that they will not use methyl bromide again.

Key words: phase-out, non-QPS, methyl bromide, phosphine fumigation, integrated storage pest management (ISPM)

Introduction

Methyl bromide is an active ingredient pesticide and it is usually used for soil treatment before planting, fumigation in storages, and also for treatment of Quarantine and Pre-Shipment (QPS). It is considered an Ozone Depleting Substance (ODS).

In an effort to overcome pest problems in grain storages, one of the common control techniques implemented is chemical control, mainly fumigation. Methyl bromide has been widely used, because of its superiority compared with

other fumigants, i. e. quite short application time, easy to be conducted, and relatively low price. Therefore, there has been a tendency of increased use of methyl bromide from year to year.

Based on the Montreal Protocol and its amendment, the use of methyl bromide as an ODS must be phased-out in line with the agreed schedule. The Government of Indonesia through the Ministry of Environment has decided to phase-out the use of methyl bromide in grain storages/non-Quarantine and Pre-Shipment (non-QPS) by the end of 2007.

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The program for the phase-out of the use of methyl bromide in grain storages in Indonesia was conducted from 2006 to 2007. This activity received financial support from the Multilateral Fund through the United Nations Industrial Development Organization (UNIDO). The Ministry of Environment of the Republic of Indonesia coordinated the implementation of this program. The Southeast Asian Minister of Education Organization (SEAMEO BIOTROP) Regional Centre for Tropical Biology was appointed by the Ministry of Environment of the Republic of Indonesia as the National Implementation Institute (NII) to conduct this program. The subject of the program was "Preparation and Organization of the Training of Trainers and Workshop-Phase-Out of the Use of Methyl Bromide in Grain Storages in Indonesia.

Starting 1 January 2008, the Indonesian Government has banned the importation of methyl bromide for fumigation in storages and soil fumigation. This was related to the regulation issued by the Minister of Trade Republic of Indonesia No: 51/M – DAG/PER/12/2007 on importation of methyl bromide for Quarantine and Pre-shipment (QPS) purpose.

Although the use of methyl bromide in grain storages has been phased-out, the Ministry of Environment Republic of Indonesia has been conducting the monitoring of the use of methyl bromide in grain storages. Monitoring has been conducted so that ex-users of methyl bromide in the non-QPS sector who have already replaced methyl bromide with phosphine and ISPM will not use methyl bromide again.

Preparation and Organization of the Training of Trainers (TOT) and Workshop

The activities covered seminars and training courses participated by the staff involved in fumigation or pest management in grain storages in several provinces in Indonesia to improve their knowledge and skill in the field of phosphine fumigation and integrated storage pest management (ISPM) as a replacement for methyl bromide in grain storages. The details of the program activities were to 1) conduct a public awareness seminar at the beginning and at the end of the project, 2) prepare the compilation of a module and a manual on the Training Course on Phosphine Fumigation Good Practices and Integrated Storage Pest Management, 3) conduct some training courses on Phosphine Fumigation Good Practices and Integrated Storage Pest Management, 4) monitor the implementation of the training.

The program on phase-out of the use of methyl bromide was terminated in December 2007.

Seminar on the Program of Phase-out of the Use of Methyl Bromide in Grain Storage in Indonesia

The seminar on the Program of Phase-out of the Use of Methyl Bromide in Grain Storage in Indonesia was held at Harris Hotel, Jakarta on 14 February 2006. The aim of the seminar was 1) to socialize the program at the beginning of the project, and 2) to give additional input/perceptions to experts in the fields of fumigation, agriculture, grain storage and related institutions to be more aware of the ozone layer damage due to the use of methyl bromide.

There were 56 participants coming from various institutions such as government agencies, Indonesian Pest Control Association (IPCA), and agencies involved in the food and feed sectors. The first session started with the presentation of the Ministry of Environment on "Strategy and Program on the Protection of Ozone Layer in Indonesia", followed by the "Explanation on the Program of Phase-Out of Methyl Bromide in Grain Storage in Indonesia". The second session was a panel discussion on "Challenge of Phase-Out of the Use of Methyl Bromide in Indonesia". In this panel discussion session five papers were presented by the Department of Trade, Department of Agriculture (represented by Plant Quarantine Service of Agriculture, Quarantine Agency, and Center for Permit and Investment), Department of Health, and the Indonesian Pest Control Association (IPCA). The seminar concluded that the participants agreed to replace methyl bromide with phosphine and implement ISPM in grain storages in Indonesia.

Compilation of Module and Manual for Training Course on Phosphine Fumigation Good Practices and for Training of Trainers on Integrated Storage Pest Management (ISPM)

The objective of the compilation of the module and manual for the Training Course on Phosphine Fumigation Good Practices was to help the participants with the understanding of the given subjects/topics during the training and also as a guide book to carry out fumigation in the field. The module contains the subjects/topics related to, for example, Problems on Global Environment, Towards the Phase-out of the Use of Methyl Bromide in Storages in Indonesia, General Description of Phosphine Fumi-

gation, and Phosphine Fumigation on Some Commodities. The manual is a practical guide for field workers of storage pest control or operators in charge of fumigation. The manual contains general knowledge on phosphine and techniques of phosphine fumigation good practices, i. e. , Introduction of Fumigation, Technical Requirement, Phosphine Fumigant, The Process of Fumigation, Process of Residue Handling, Failure in Fumigation, Storage and Transportation of Phosphine, and List of Important Storage Insect Pests which could be Controlled by Phosphine Fumigation.

The objective of the compilation of the module and the manual for Training of Trainers on Integrated Storage Pest Management (ISPM) was to increase the participants' understanding of the given subjects/topics during the training and provide a guide book to implement ISPM in the field. The module of the training contains the subjects/topics related with the training, i. e. , Problems on Global Environment, Towards the Phase-out of the Use of Methyl Bromide in Storages in Indonesia, Integrated Storage Pest Management, Introduction of Storage Insect Pests, Ecology of Storage Insect Pests, Storage Fungi in Grains, Population Monitoring of Storage Insect Pests, Sampling Technique for Commodities, and Pesticide Application for Controlling Insect Pests. The manual serves as a practical guide for field workers to carry out integrated storage pest management activities. The topics in the manual cover Introduction, Introduction of Storage Insect Pests and Storage Fungal Species, Design and Structure of Warehouse, Storage Sanitation and its Surrounding Environment, Implementation of Initial Standard Quality Regulation of Grains, Inspection and Monitoring, Management of Stock, and Pesticides and Fumigants Application.

1st Training Course on Phosphine Fumigation Good Practices, and 2nd Training Course on Phosphine Fumigation Good Practices and the Use of Phosphine Fumigation Equipment

The 1st Training Course on Phosphine Fumigation Good Practices, the 2nd Training Course on Phosphine Fumigation Good Practices, and the Use of Phosphine Fumigation Equipment were held at SEAMEO BIOTROP, Bogor, Indonesia, on 27 – 29 March 2006 and 13 – 14 August 2007, respectively. This first training was attended by 32 participants and 2 observers, while the second training was attended by 41 participants and 2 observers.

The objectives of these trainings were to provide the participants with the understanding and skill to properly conduct phosphine fumigation. The difference in the two training courses was at the second training course participants received grant equipment for phosphine fumigation and ISPM from UNIDO through the Ministry of Environment and SEAMEO BIOTROP.

The activities of the trainings included lectures and hands-on exercises on good fumigation practices and the use of some fumigation and ISPM equipment that were granted to the participants. UNIDO granted the same kind of equipment in two phases. The first phase was delivered to the beneficiaries with the technical assistance through the activities of the 2nd Training Course on Phosphine Fumigation Good Practices and the Use of Phosphine Fumigation Equipment. The equipment consisted of PH₃ meters, sand snakes, plastic fumigation pipes, full face masks, filter canisters, plastic sheet, and ISPM equipment, i. e. , grain moisture testers, thermo-hygrometers (in/out), light traps, bait traps, card traps, yellow sticky traps, and knapsack sprayers. The equipment for calibrating PH₃ meters was donated to SEAMEO BIOTROP.

The second phase was carried out through the activities of the Workshop on Demonstration of Leak Detector that was held at SEAMEO BIOTROP, 20 February 2008. The equipment consisted of PH₃ meters, sand snakes, leak detectors, and ISPM equipment, i. e. , grain moisture testers, thermo – hygrometers (in/out), and light traps.

The training courses were successfully conducted. The success of the training was concluded based on the results of early and final evaluations of the participants. The evaluation form contained questions related to ozone layer, storage pest, fumigant and fumigation. The final evaluation showed a significant increase in the results (scores) which means that the participants' knowledge on the subjects had improved.

Training of Trainers on Integrated Storage Pest Management (TOT on ISPM)

The Training for Trainers on Integrated Storage Pest Management was held at SEAMEO BIOTROP (24 – 28 April 2006). The objectives of this training were to provide the participants with the understanding and skill on the techniques of integrated storage pest management so that the participants could share their knowledge gained in this training with other

staff members in their respective institutions as well as with other parties involved in storage pest management.

The training course was held successfully. There were 10 participants coming from food industries and related institutions. The success of the training was based on the final evaluations that showed a significant improvement in the knowledge of the subjects as compared to the evaluation at the beginning of the training. The evaluation form contained questions about the ozone layer, storage pests, and integrated storage pest management.

TOT on ISPM: On-Site Development (Monitoring)

TOT on ISPM: On-site Development (Monitoring) was the continuation of TOT on ISPM. After the completion of the training course on ISPM, the participants should implement their knowledge gained in this training in their home region. The results of the implementation were monitored by the training committee of SEAMEO BIOTROP together with the staff of the Ministry of Environment and National Project Coordinator (NPC).

The objective of this activity was to evaluate each participant's implementation of their knowledge that was gained during Training for Trainers on ISPM.

Based on the results of the completed checklist filled out during the monitoring, ISPM was mostly implemented in all institutions of the participants, although it has not been fully implemented in all. In general, the policy of ISPM implementation at all institution of the participants was supported by the management side.

Regional Training Course on Integrated Storage Pest Management

The Regional Training Course on Integrated Storage Pest Management was conducted as a follow up of the TOT on ISPM at SEAMEO BIOTROP on 24 to 28 April 2006. The participants of the TOT on ISPM were obligated to transfer their knowledge gained from the training to other staff members in their work places as well as to other personnel who are responsible for storage pest management in their region.

The objectives of this training were to distribute the ISPM knowledge and technology as a replacement for the use of methyl bromide in grain storages in the respective areas of the participants, .

The materials for this course were similar with the materials given to the participants of the TOT on ISPM. Therefore, the participants

were given the modules and manuals of Integrated Storage Pest Management as well as Phosphine Fumigation Good Practices.

In these training courses, SEAMEO BIOTROP collaborated with the supervisor management of the participants who paid serious attention to the success of the ISPM program, especially Perum BULOG.

Representative in 7 provinces were trained. The time schedule of these training courses is shown in Table 1.

Table 1. The time schedule of the Regional Training Courses on ISPM

No	Province	Venue and Time	Number of Participant
1	DKI Jakarta and West Java	SEAMEO BIOTROP, Bogor, 21 – 23 November 2006	24
2	Central Java	PT Garudafood, Pati, 4 – 5 January 2007	13
3	East Java and East Kalimantan	Sidoarjo, 28 – 30 March 2007	23
4	Banten	Serang, 23 – 25 May 2007	11
5	South Sulawesi	Makassar, 18 – 20 June 2007	22

The practical work activities that received serious attention were preparing, installing and collecting of data from various insect traps, i. e. , carton trap, bait trap, sticky trap, and also light trap. This was due to the fact that the use of various insect traps to determine the population of storage insect pests was a new technique for staff members of Perum BULOG. Participants were very enthusiastic because of the superiority in the use of these insect traps to determine the storage insect pest population which does not require sampling of rice. Especially for light traps, it has more advantage in trapping moths which could not be trapped by other traps (carton and bait traps). The use of light traps supported the policy of Perum BULOG, as their warehouses should be free from *Ephestia*. Storage insect population is usually monitored by sampling of milled rice using a probe (a spear sampler). The participants expected that the monitoring technique using insect traps could be adopted and implemented at Perum BULOG circle. Nevertheless, this technique has its weaknesses, i. e. , there is no correlation between data determined and the real population. Further research is still needed.

Seminar to Socialize the Program on Phase-Out of the Use of Methyl Bromide in Grain Storage in Indonesia

This seminar was the last activity of the project on Preparation and Organization of the Training of Trainers (TOT) and Workshop, Phase-Out of the Use of Methyl Bromide in Grain Storage in Indonesia.

The goals of the seminar were to disseminate the results of the program on phase-out of the use of methyl bromide in grain storage in Indonesia, and to plan a policy that will be implemented to control the use of methyl bromide after its phase-out in Indonesia.

The seminar was held at SEAMEO BIOTROP, Bogor, on 20 November 2007. This seminar was attended by 78 participants coming from various institutions such as UNIDO, Ministry of Environment, SEAMEO BIOTROP, Bogor Agricultural University, Perum BULOG, Department of Health, Department of Agriculture, Customs Office, Department of Trade, fumigation service companies involved in the Indonesian Pest Control Association (IPCA), agrochemical companies, estate enterprises, wood packaging enterprises, food and feed industries, methyl bromide importers, etc.

The seminar was divided into two sessions, i. e. , panel discussion and discussions concerning the expectation and the follow-up activity for the program of phase-out of the use of methyl bromide in grain storages in Indonesia.

Conclusions

The activities on the Preparation and Organization of Training of Trainers and Workshop of Phase Out of the Use of Methyl Bromide in Grain Storage in Indonesia were conducted based on the cooperation between the Ministry of Environment with United Nations Industrial Development Organization (UNIDO) and SEAMEO BIOTROP. The Letter of Contract No. SPK – 01/Dep. III/LH/01/2006 was well implemented.

In general, the participants considered that the training was very well organized. They ex-

pected that the duration of the training should be longer and sustainable. The enterprise management of the training participants supported very much the implementation of ISPM to replace the use of methyl bromide in controlling storage pest in their enterprises. To support the implementation of ISPM at Perum BULOG, its enterprise management gave a very good response by increasing the number of training participants, either through the joint trainings planned by Perum BULOG and organized by SEAMEO BIOTROP, or a training organized by PERUM BULOG with National Project Coordinator and SEAMEO BIOTROP scientists as the resource persons. This means that getting the ball rolling has a significant effect on transferring the knowledge and technology on ISPM and phosphine fumigation. The Indonesian Pest Control Association (IPCA) expects a sustainable cooperation with SEAMEO BIOTROP in implementing training on fumigation, either for fumigators or superintendents.

Although the project activities on the Phase-Out of the Use of Methyl Bromide in Grain Storage in Indonesia has ended, the Ministry of Environment is expected to pay continuous attention, especially on controlling the use of methyl bromide after its phase-out starting January 2008 for its use in grain storages for Non-QPS. Coordination among related institutions and the institution responsible to control the use of methyl bromide is needed in order to guarantee that the users of methyl bromide, who have already replaced the use of methyl bromide with phosphine, will not use methyl bromide again. Consequently, decisions made by several related departments concerning the prohibition of using methyl bromide in grain storages in Indonesia and its sanction are needed. Therefore, regulation and sanction for offenders either importers, distributors or users of methyl bromide, especially for grain storages in Indonesia should be immediately prepared.