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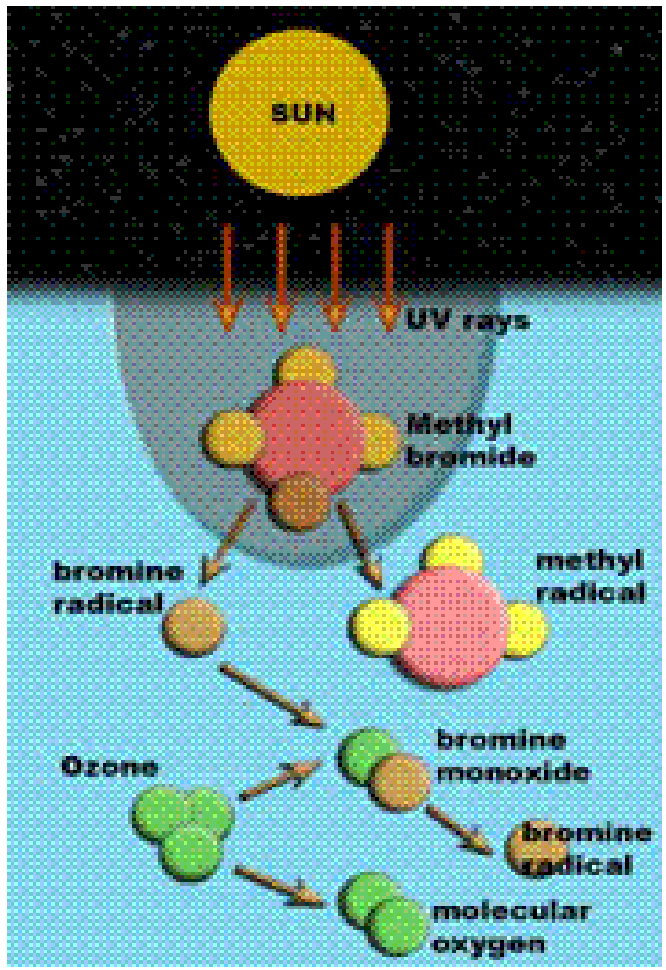
- **Strategy in Phase-out the Use of Ozone Depletion Substances**

  in Agriculture

  in Developing Countries (Montreal Protocol)



Background of Study

- Under The Montreal Protocol of 1991, methyl bromide was defined as a chemical that contributes to depletion of the Earth's ozone layer. The definition was based on scientific data.

What is Methyl Bromide?

- The chemical name (IUPAC, CAS) for methyl bromide is bromomethane, and it is classified as a alkyl bromide. It is a colorless and odorless gas at normal temperatures and pressures.

Fig.1. Effect of alternative treatments on total weeds.

- Cut-flower (liatris) crop at Agroindustria del Valle, Jarabacoa. Treatments with the same letter are not significant different according to a Duncan's Multiple Range Test at 0.01 significance level.

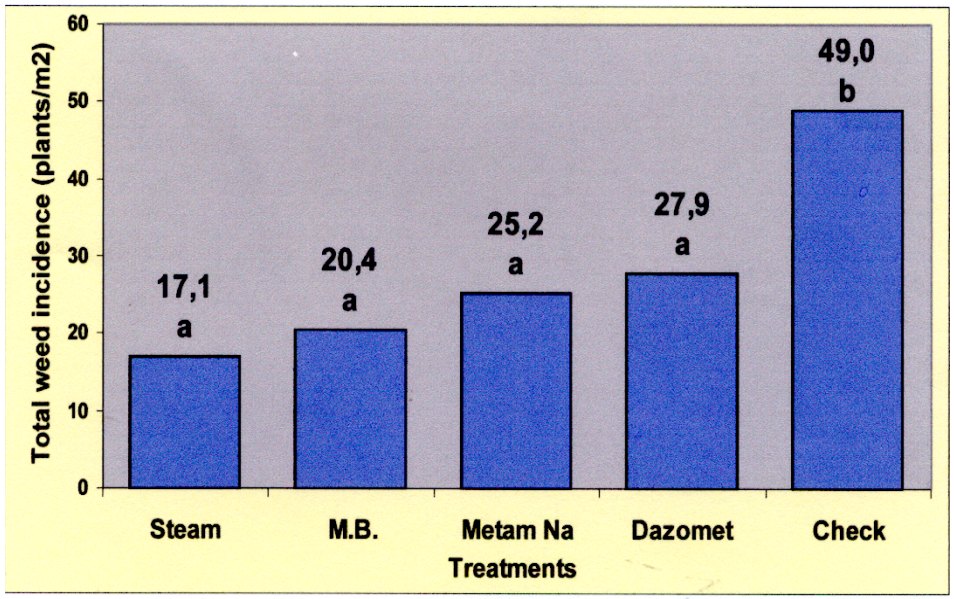


Fig.2. Effect of alternative treatments on weed type and Cyperus rotundas.

- Cut-flower (liatris) crop at Agroindustria del Valle, Jarabacoa. Treatments with the same letter are not significant different according to a Duncan's Multiple Range Test at 0.01 significance level.

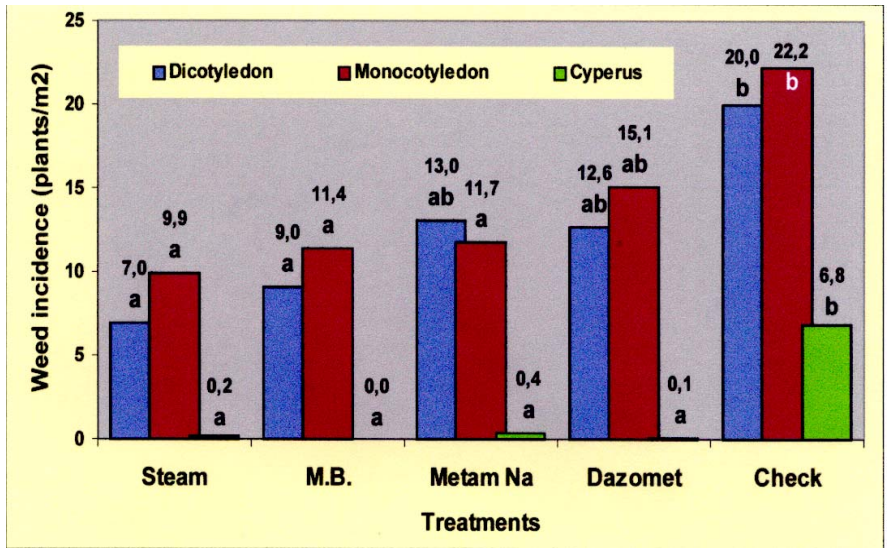


Fig.3. Effect of treatments on plant high, temporal series. Cut-flower (liatris) crop at Agroindustria del Valle, Jarabacoa.

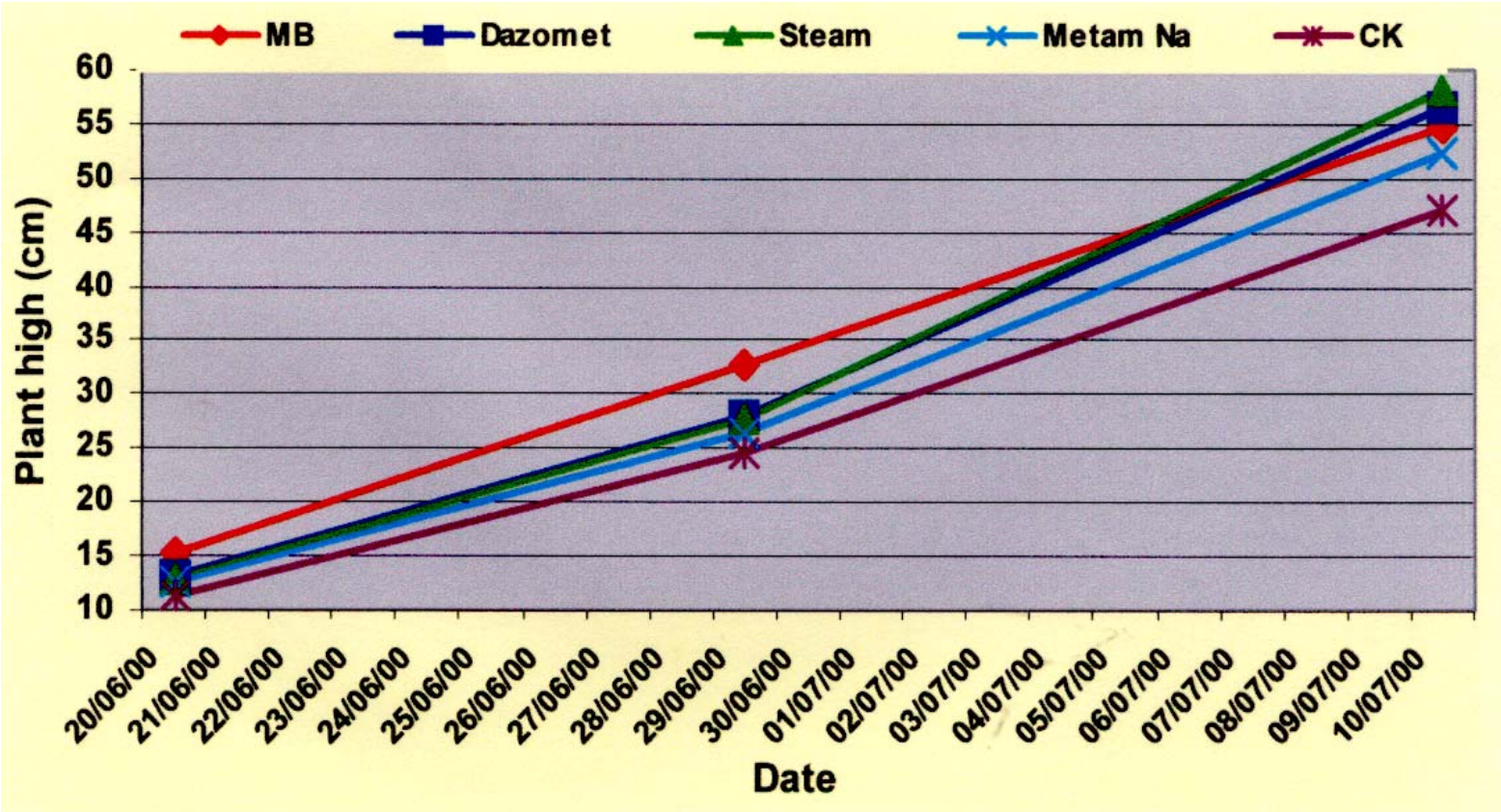


Fig.4. Effect of alternative treatments on plant high. Cut-flower (liatris) crop at Agroindustria del Valle, Jarabacoa.

- Treatments with the same letter are not significant different according to a Duncan's Multiple Range Test at 0.05 significance level.

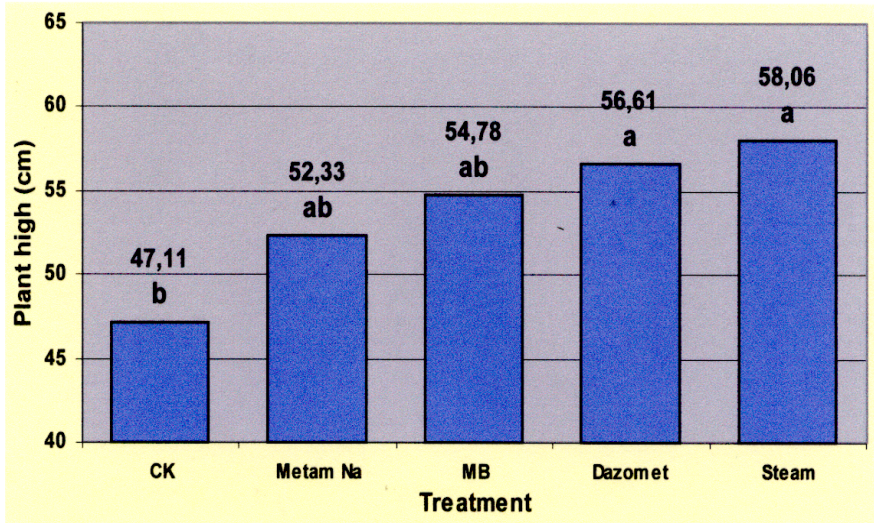


Fig. 5. Liatris growth at Agroindustrias del valle, Jarabacoa.

- **Temporal series**

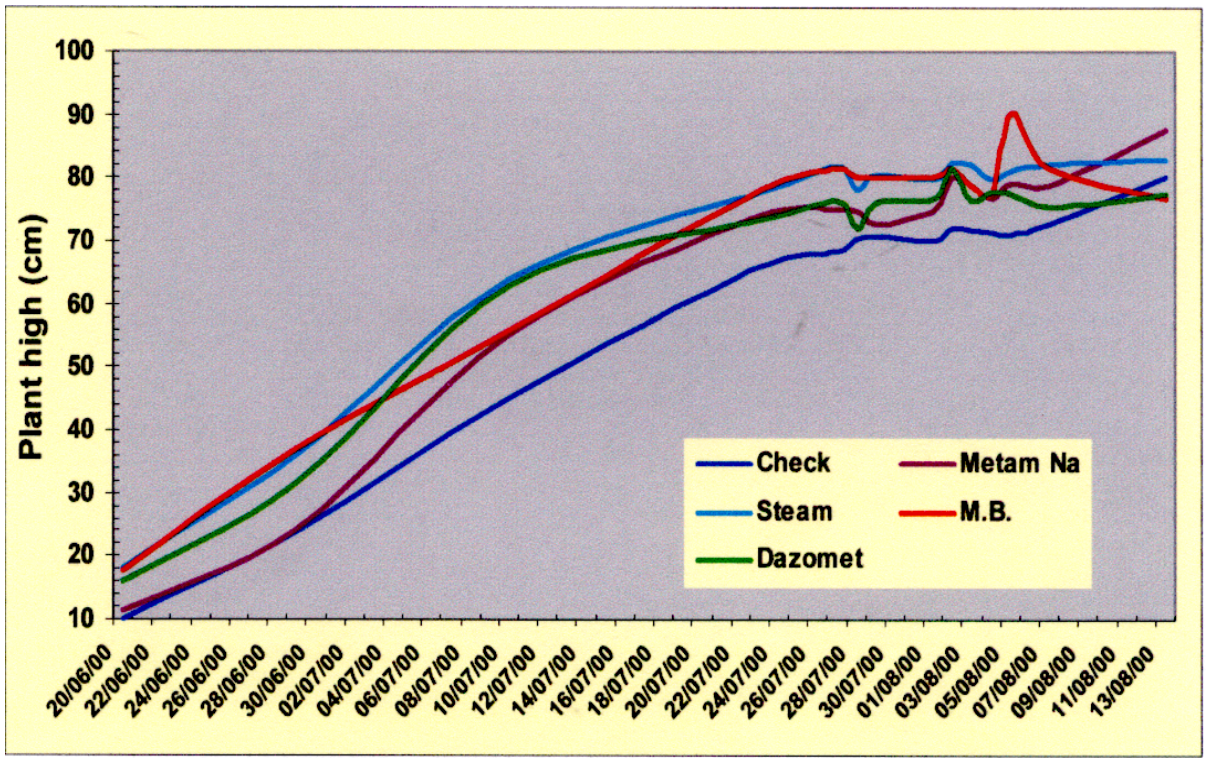


Fig. 6. Modeling liatris growth at Agroindustrias del Valle, Jarabacoa. Neperian logarithm fitting.

- **Neperian logarithm fitting.**

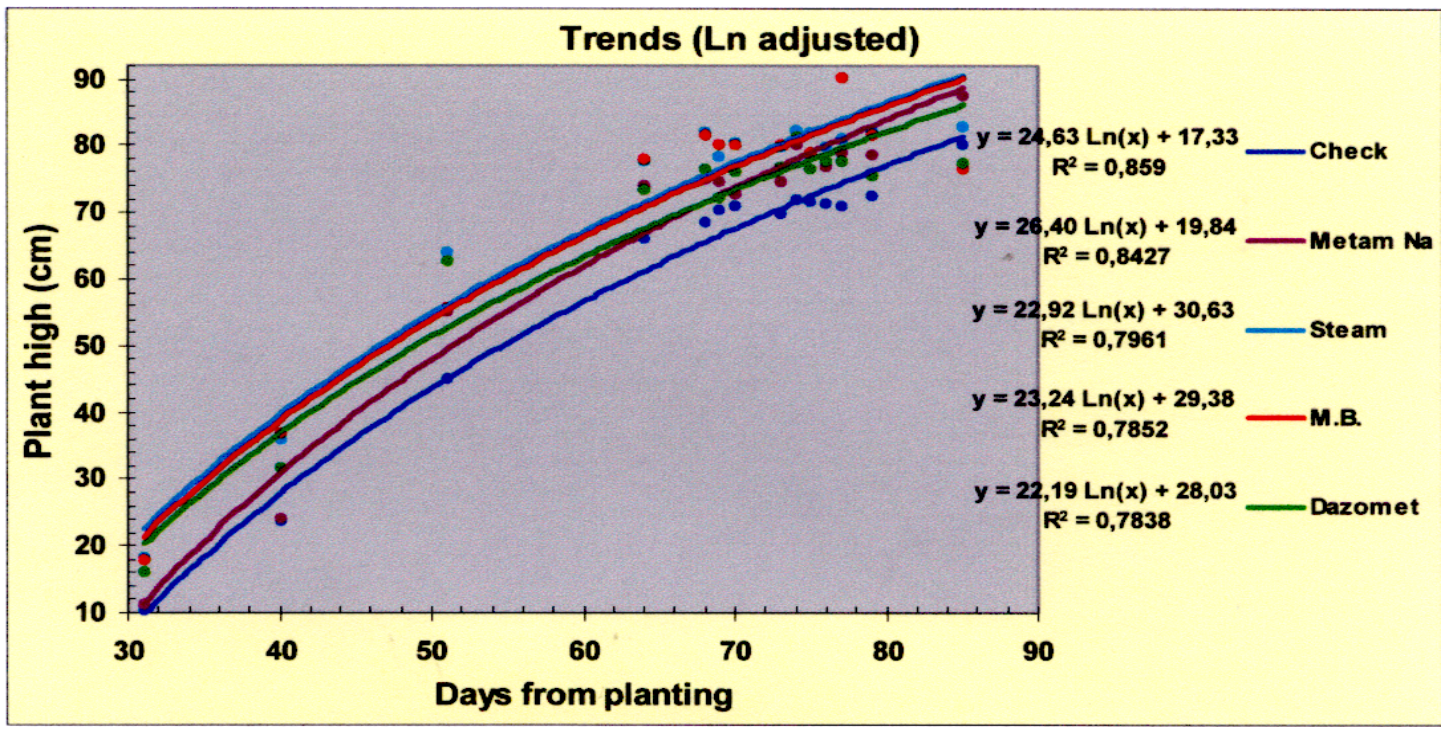
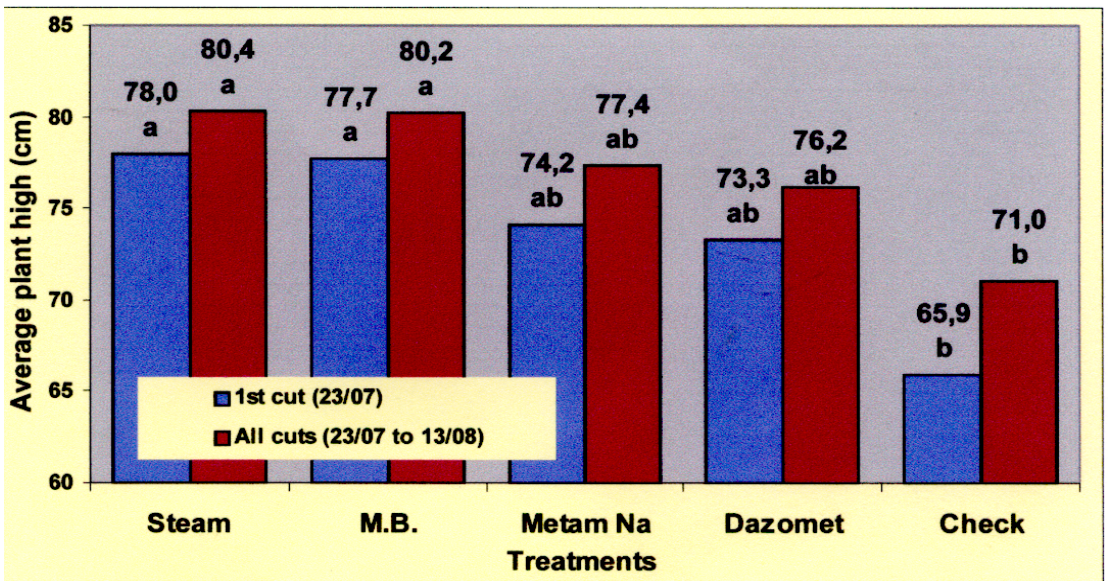


Fig. 7. Effect of alternative treatments on flower size at Agroindustrias del Valle.

- **Treatments with the same letter are not significant different according to a Duncan's Multiple Range Test at 0.01 significance level.**



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- **Project Title:**

- **Phase-out the Use of Carbon Tetrachloride (CTC) as Fumigant in Grain Storage in DPR of Korea**

PROJECT OBJECTIVES

- The objective of the project is to complete the phase out of 165 ODP MT (150 MT) Carbon tetrachloride (CTC) in Korean agriculture (grain storages). CTC is used as fumigant in grain storages to protect grain again pest organisms.
- Project has to establish the necessary framework conditions, (institutional activities, legislative and policy approaches, etc.) to ensure a timely and sustainable phase-out of CTC in grain storages.
- Methacrifos is selected as the most suitable options for the alternatives to CTC in the grain storage in the DPR of Korea.

Sector background

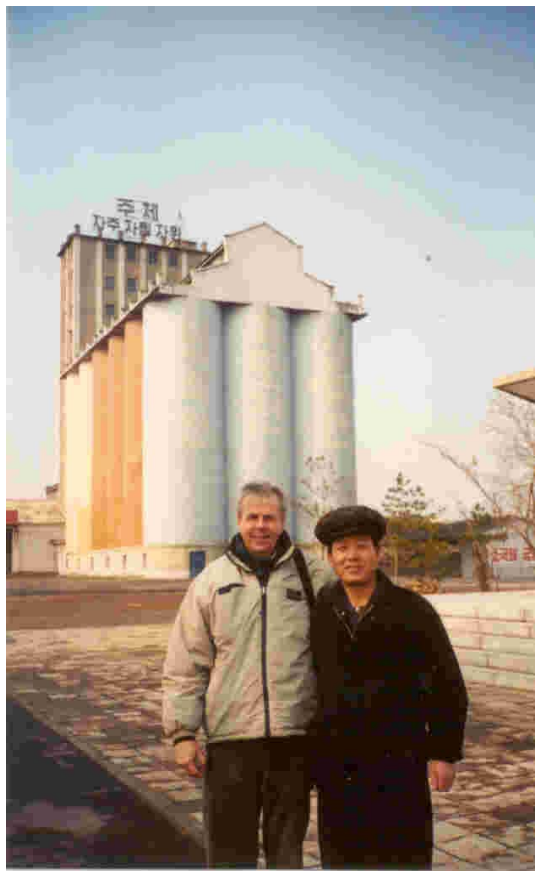
Fumigation in agriculture	ODS	1999		2000		2001		2002 *		2003 *	
		MT	ODP MT	MT	ODP MT	MT	ODP MT	MT	ODP MT	MT	ODP MT
Grain Silo fumigation	CTC	240	264	150	165	150	165	170	187	165	182
Soil fumigation	CTC	200	220	150	165	150	165	130	143	95	105
TOTAL		440	484	300	330	300	330	300	330	260	287

* Note: amount estimated by NCCE

Table: 1 CTC as fumigant used in agriculture

PROJECT BACKGROUND

- The agriculture of the DPR of Korea presents 16,8 percents of GDP. The agriculture operates on the 1682000 ha (2001) arable land (it presents 14% DPRK territory), where permanent crops presents two percents from the above-mentioned area.



Pest problems and pests management

- **Main pests in grain storage in the DPR of Korea are as follows: *Sitophilus Zeamias, Rhizopertha Dominica, Thribolium Castaneum, Sitotroga Cerealella, Plodia Interpumitella, Paralispa Gulaus, Cadra Cantella, Callosobrachus Chinensis.***

- **Among them the *Sitophilus Zeamias* and *Plodia Interpumitella* are considered as ones that give the biggest damage in grain storage. The damage by rodent is not ignored either.**

Fumigants and Fumigation

- The CTC consumption (theoretically) around 150 MT per year under pre-condition that the grain stock has been treated only once a year.

- In the DPR of Korea was in 2001 treated in warehouses and silos totally 464000 MT of grain.

JUSTIFICATION OF PROJECT

- On 1 January 2010, CTC is to be phased out completely. On 1 January 2015, MB is to be phased out completely. The application of MB as fumigant at present in Korean agriculture is 25 MT.

- The Academy of Agricultural Sciences, Agrochemicalization Research Institute, Pyongyang is proposing as a new alternative fumigant Methacrifos as a substitute of CTC in the Korean agriculture

PROJECT DESCRIPTION

- The project will seek to replace current uses of CTC with Methacrifos

- Methacrifos in outdoor storage will be replaced by an improved storage methodology that will facilitate use of Methacrifos as an alternative;

The project will seek to replace current uses of CTC with Methacrifos

- The procedures and technology for Methacrifos usage for indoor fumigation of sack stacks will be upgraded

- Staff will be trained in rodent control procedures in order to minimize fumigant usage

The project will seek to replace current uses of CTC with Methacrifos

- Assistance will be provided to enable a suitable policy framework to be adopted for governmental regulation (phase-out) of CTC.

Phase out schedule

CTC phase out schedule				
	2002	2003	2004	2005
Tons phase out	0	40	55	55
TOTAL	**0**	**40**	**95**	**150**

Table: 2 Phase-out schedule in grain storages in DPR of Korea

Policy framework

- 1) To establish a register of CTC producers (DPRK) and importers and reject any import authorization over the consumption limits (grain storage)
- 2) To revoke registration of CTC as a grain storage fumigant and ban its use once the project has been finalized.
- 3) To reduce the aggregate consumption of CTC by the amounts specified above and by 165 ODP MT, by the year 2006.

PROJECT INPUTS

- **Training is required in new storage methods and rodent pest control especially during the first and the second year. Additional activities like workshops, handouts copies, manuals, audio-video production and guidelines for the storage sector will accompany the implementation of the project.**