2. Country reports[1]

BANGLADESH

by M.A. Aziz

Introduction

Bangladesh is predominantly an agricultural country with an area of 147 570 sq. km. Agriculture plays an important role in the lives of Bangladeshi people.

The major crops grown in the country are rice, wheat, jute, potato, sugarcane, vegetables and tea. The warm and humid climatic conditions of the country, increased use of modern high yielding varieties of crops and more use of chemical fertilizers are highly favorable for development and multiplication of pests and diseases. The estimated loss in yields due to attacks from pests and diseases annually ranges from 15 to 25 percent. The severity varies depending on the variety, season and climate. The main pests of economic importance in different crops are:

Crops	Pests and Diseases
Rice	Stemborer
	Gallmidge
	Hispa
	Brown plant hopper
	Ear cutting caterpillar
Jute	Red mites
	Hairy caterpillar
Sugarcane	Topshoot borer
	Termites
Potato	Late blight
Vegetables	Aphid
	Fruit fly
Tea	Red spider mite
	Mosquito bug
	Blister blight
For all crops	Weed
Mango	Hopper

Pest control in Bangladesh is dependent on the use of pesticides, the bulk of which are in granular formulations. However, the total usage is approximately 20 000 metric tons of formulated products which is not high compared to usage in other countries in the Asia-Pacific region. In practice, farmers use pesticides only when infestation is evident; even then, only minimal doses are applied.

[1] The country reports have not been formally edited and the designations and terminology used are those of the authors.

Use of pesticides

The use of pesticides in Bangladesh is based on minimum curative applications with 70 percent in rice and the remaining 30 percent on tea, sugarcane, potato, mango, banana & vegetables. Key pesticides being used are carbofuran 5 percent GR, Diazinon 10 percent GR, Sulphur 80 percent WDG, Mancozeb 80 percent WP, Chlorpyriphos 20 percent EC, Cypermethrin 10 percent EC, Cartap 50 percent SP, Quinalphos 25 percent WC, Pretilachlor 50 percent EC, Propiconazole 25 percent EC and Phenthoate 50 percent EC, Butachlor etc. Consumptions of pesticides during last three years are:

Year	Group	Consumption (M.T)	Total (M.T)
2002	Insecticide	13 974.00	17 393.00
	Fungicide	2 419.00	
	Acaricide	20.00	
	Herbicide	964.00	
	Rodenticide	16.00	
2003	Insecticide	13 767.00	18 080.00
	Fungicide	2 941.00	
	Acaricide	11.00	
	Herbicide	1 354.00	
	Rodenticide	7.00	
2004	Insecticide	14 351.00	22 116.00
	Fungicide	4 279.00	
	Acaricide	15.00	
	Herbicide	3 463.00	
	Rodenticide	08.00	

Pesticide industry profile

The Pesticide industry in Bangladesh is comprised of private companies and foreign companies. It is represented by an organization, Bangladesh Crop Protection Association. Total members of the association are around 50. Pesticides are distributed through distributors.

Local production of pesticides

Because the Government is committed to a policy of self sufficiency, the Government provides with duty waiver on import of technical material and other related adjuvant for local formulation of pesticides. There are 10 companies operating in different areas of the country producing some granular and emulsifiable concentrate formulation. Key pesticides being formulated in the country are Carbofuran 5 percent GR, Diazinon 10 percent GR, Butachlor 5 percent GR, Malathion 57 percent EC, Fenitrothion 50 percent EC and Diazinon 60 percent EC. Criterion required for obtaining a formulation license is mostly in consonance with the 'Integrated International Safety Guidelines for Pesticide Formulation in Developing Countries'. Besides, clearance is to be obtained from the Department of Environment after establishment of the facilities for local formulation. Department of Environment after assessing and examining the product emitted during formulation of certain pesticide consider recommendation for a formulation license. Quarterly medical check up for the workers of the formulation plant is mandatory.

Pesticide regulatory policies

Agricultural pesticides have been primarily in use since early sixties. However, Pesticide Ordinance was promulgated in 1971 to regulate import, manufacture, formulation & distribution and use of pesticides. The ordinance was amended in 1980 mainly to accommodate the provision for licensing and the trade was handed over to the private sector. Pesticide rules were framed in 1985 for carrying out the provision of the ordinance.

The Ordinance extends to all pesticides, whether used for agriculture, public health or any other purpose. The Ministry of Agriculture through the Plant Protection Wing of the Department of Agricultural Extension (DAE) administers it. The Ordinance and the rules provide the basic framework for the regulation and control conforming to the proposed guidelines of the UN Food and Agricultural Organization (FAO).

The Ordinance provides for a Pesticide Technical Advisory committee, a laboratory, Government appointed analysts and inspectors required licensing of all handlers of pesticides, controlling imports, manufacture and formulation of pesticides, packaging, labeling, storage guidelines and safety precautions for handlers of pesticides.

However, implementing the legislation depends on a large extent on available expertise, laboratory facilities and field research stations. The pesticide laboratories operated by chemists, management staff including a Director, Additional Director, Deputy Director and Regulation Officer of Plant Protection.

Registration scheme

The registration scheme incorporates most of the concepts and guidelines recommended by Food and Agricultural Organization and certain features from countries such as Pakistan, India, Philippines and the United States.

Importing, formulating, repackaging, selling, holding in stock for sale and advertising of any pesticide is prohibited unless the product has been registered:

1. An application form, according the provision Pesticide Rules along with literature and a sample of the product are submitted to the Plant Protection Wing of the Department of Agricultural Extension. All submitted documents are reviewed and the sample is verified in the pesticide laboratory of Plant Protection for verification of the specification. The data requirements for registration are essentially in accordance with FAO guidelines that include: physical and chemical properties; toxicological data; efficacy data; residues and environmental effects. Foreign data are acceptable, except for efficacy and fish toxicity studies. These must be conducted in Bangladesh in accordance with prescribed guidelines.
2. Upon receipt of the results of the chemical analysis the sample is sent to concerned Government research institutes for bioefficacy tests under field conditions. The results of the efficacy trials are evaluated by a sub-evaluation committee composed of experts representing various research institutes, Department of Environment, Health and Fisheries.

The Pesticide Technical Advisory Committee, chaired by the Secretary, Ministry of Agriculture, finally grants registration to a brand of pesticide after thorough examination of all reports when it is recommended by sub-evaluation committee. A registration certificate which is

valid for three years and renewable for the same period is issued by the Director of Plant Protection if the products prove effective for the intended purpose. Under the present scheme, registration may be obtained between six months to three years from the date of application, depending on the number of seasons of trials required.

List of registered pesticides

A total of 628 brands of agricultural pesticides and 170 brand of public health pesticides are registered which are as follows:

Agricultural pesticides:

Pesticides	Active ingredients	Brands
Insecticides	43	401
Fungicides	23	81
Acaricides	09	53
Herbicides	13	78
Rodenticides	06	15
Total	94	628

Public health pesticides:

Pesticides	Active ingredients	Brands
Insecticides	21	170

Following acceptance for registration, the applicant must submit a copy of the proposed label to the Director, Plant Protection before marketing. All labels must be printed in Bengali, must include the expiration date and must be marked “POISON” and display the skull and crossbones symbol. Color coding differs slightly from FAO code.

Labeling of pesticides

All pesticides regardless of classification carry the word ‘POISON’. Only class I formulation displays skull and cross bone. Class II and class III formulation carries the word ‘DANGEROUS’ and ‘CAUTION’ respectively. Three panel labels are used which incorporates most of the features of the FAO guidelines on labels. The following information is provided on the label of the pesticide containers:

<table>
<tr><th colspan="3">Three Panel Label</th></tr>
<tr><td>Brand name of pesticide</td><td>Active ingredient statement</td><td>Precautionary measures</td></tr>
<tr><td>Common name</td><td>Dosage rate</td><td>Symptoms of poisoning</td></tr>
<tr><td>Registration No.</td><td>Guidelines for users</td><td>First Aid Treatment</td></tr>
<tr><td>Net Content</td><td>Name & address of the manufacturer</td><td>Antidote</td></tr>
<tr><td>Batch No.</td><td>Name & address of registrant</td><td>Supplementary treatment</td></tr>
<tr><td>Date of manufacture</td><td rowspan="3">DIAMOND
SIGNAL WORD</td><td>Advice to Doctors</td></tr>
<tr><td>Date of expiry</td><td>Re-entry period</td></tr>
<tr><td>Maximum retail price</td><td></td></tr>
</table>

The label is printed in national language i.e. in Bengali.

Enforcement mechanism

Ensuring the quality of the pesticides in the market and regulating the formulation and packaging of products after registration is an important aspect of pesticide legislation. Therefore inspectors are appointed to ensure enforcement through regularly visiting pesticide dealers and collecting samples for checks on specifications. In cases of adulteration, penalties are imposed. To strengthen the registration process and to ensure enforcement of the provisions of the legislation, additional controls have been implemented. These include controlling imports, controlling the availability and use of pesticides, and licensing handlers. For example, pesticides cannot be imported unless previously registered, packed and labeled as prescribed. In addition, the importer must have an import license and proper storage facilities.

Banned or restricted pesticides

Pesticides which do not conform to the regulatory standards are not permitted for registration. The following pesticides are banned in Bangladesh for use in agriculture:

Generic name		
phosphamidon	monocrotophos	methyl bromide
dichlorvos	methamidophos	BHC
dieldrin	heptachlor	2, 4, 5-T
DDT	chlordane	

Licensing requirements of pesticide handlers

Under the provision of the Pesticide Ordinance, all pesticide handlers must obtain a license before they can engage in any business dealing with pesticides. All types of licenses are valid for a period of two years unless earlier revoked or cancelled. A renewal for a same period may be obtained by submitting the appropriate fee.

Training in the safe and efficient use of pesticides

The Plant Protection Wing, Department of Agricultural Extension, emphasizes training programs designed to meet the needs of specific target clientel. After handing over the pesticide trade to the private sector in 1981 a training program for the pesticide dealers was conducted by the Plant Protection Wing, in collaboration with ESCAP/ARSAP. Meanwhile, the industry has accepted the responsibility of training their personnel. In this context, progress has been made and pesticide dealers are being trained on safe and efficient use of pesticides by the industry.

Regulatory deficiencies and other problems

In theory, the regulatory scheme is systematic. But in practice, however, there are gaps between the policies and implementation. For example, while the intent of the Ordinance and Rules to monitor formulations and residues is commendable, the lack of facilities and trained analysts does not allow proper monitoring. Thus, specification of pesticides on the market may differ from those registered.

Lack of residue monitoring

Although the Government is concerned about pesticide residues in the food and the environment, staff and facilities to conduct the necessary monitoring programs are not available. In addition the country has not yet established legal limits for residues and depends upon Codex allowable limit which are not always proposed for all crops and major pesticides used within the country.

Conclusion

In brief, I tried to give you an overall idea of the pesticide registration, requirements, implementation process and their monitoring for maintaining the quality of the pesticide. Efforts are underway to implement FAO guidelines at all levels. In this regard a joint collaborative program among the member countries in this region with the assistance of FAO is a must.

QUESTIONNAIRE SUMMARY

Bangladesh

Selected Country Statistics:

Agricultural Population	**77.3 million**	**Agricultural Land**	**8.4 million ha**
GDP $51 897 million	Agric. GDP: 22.7%	GNI per capita: $400	Hunger: 30%
FAOSTAT Pesticide Data	Export $0.05 million	Import: $18.5 million	Use: 6 340

GDP = Gross Domestic Product; GNI = Gross National Income; Hunger = Population below minimum energy requirement; FAOSTAT = latest data entry between 1998 and 2002

Institutional Profile

Ministry	**Legislation**	**Registration**	**Licensing**	**Enforcement**	**Testing**	**Training**	**Monitoring**	
							Environm.	**Health**
Agriculture	PPW	PPW	PPW	PPW	BARI, etc.	DAE	PPW	PPW
Environment								
Health								

Industry Associations: Bangladesh Crop Protection Association
Non-Governmental Associations: Bangladesh Paribesh Undolon

A. Pest and Pesticide Management	
IPM policy declared?	**Yes**
IPM mentioned in…	
Crop Protection Policy?	**Yes**
Agric. Sector Policy?	**Yes**
Other laws/documents?	
National IPM Program?	**Yes**
Dept: **DAE**	
IPM extension projects?	**Yes**
IPM research projects?	**Yes**
Pest resistance problems?	--

B. Testing, Quality Control and Effects	
Laws for pesticide specifications?	**Yes**
Low quality products in market?	--
Quality control laboratory?	**Yes**
Own analyses in 2004:	
Outside analyses in 2004: **200**	

C. Health and Environmental Information	
Data on pesticide poisoning cases?	--
occupational exposure cases:	
accidental exposure cases:	
intentional/suicide cases:	
Pesticide poison facilities?	**Yes**
Number of facilities: **64**	
Poison Information and Control Centers?	--
Number of centers:	
Significant environmental contamination?	--
Data on effects on wildlife & ecosystems?	--
Pesticide residue monitoring system?	--
Number of analyses 2004:	

D. Pesticide Manufacture, Use and Trade		
Pesticide Volume	*Tons*	*$'000 Value*
Imports	**4 000**	**76 000**
Manufacture		
Exports		
Sales		
Pesticide Use Profile	*Tons*	*$'000 Value*
Agriculture (total)	**3 600**	**73 000**
Insecticides	61%	59%
Fungicides	19%	25%
Herbicides	11%	10%
Other	8%	7%
Veterinary		
Public Health	**20**	**1 000**
Household	**15**	**75 000**
Other		
TOTAL	**3 635**	

E. Selected Standards of Code of Conduct	
Illegal trade estimates?	--
Estimated amount 2004	
Collection of old containers and pesticides?	**Yes**
Inventory of outdated/obsolete products?	**Yes**
Operational pesticide registration system?	**Yes**
Violations in 2004	
Existing facility licensing system?	
Inspections in 2004: **40**	
Highly toxic products restricted?	**Yes**

Questionnaire responses: Yes = Yes; -- = No; ? = don't know; (blank) = no answer

CAMBODIA

by Lorn Socheata

Introduction

Cambodia does not produce pesticides and all agricultural chemicals must be imported, and there are no important agrochemical distributors in the country. Pesticide management is high on the agenda of the Government of Cambodia. A number of reports that pointed at the broad availability and use of highly hazardous pesticides has accelerated government initiatives to tighten pesticide regulation. Several regulations and a pesticide registration system have been established. However, effective enforcement of the regulations remains a challenge that needs to be tackled soon.

The Ministry of Agriculture, Forestry and Fisheries (MAFF) is responsible for the management of pesticides in the country, which has two main institutions that play an important role as implementing authorities.

The Department of Agricultural Legislation (DAL)

Under DAL there is a Bureau of Agricultural Material Standard (BAMS), which is responsible for registration for agricultural materials in Cambodia. With technical advices from concerned institutes, it acts as assisting unit for MAFF that is responsible for registering and enforcing measures to control the quality of Agricultural Materials such as pesticides, fertilizers, seeds and planting materials, veterinary medicines, feed stuffs and feed additives.

The functions and duties of the BAMS are as follow:

- To register and issue the permission of Agricultural Material exploitation.
- To register of annul the registration or revoke the permission of Agricultural Material exploitation.
- To promulgate guideline on registration of Agricultural Materials.
- To establish quality standards according to the specifications of each Agricultural Materials exploitations.
- To control Agricultural Material exploitations.
- To cooperate with concerned ministries, to determine and control the Agricultural Material exploitation and their compounds.

The Department of Agronomy and Agricultural Land Improvement (DAALI)

DAALI is responsible for technical advice to BAMS for registering and enforcing measures and managing the use of pesticides in the country. The **Plant Protection and Phytosanitary Inspection Office (PPPIO),** structured under DAALI, is responsible for implementation.

The functions and duties of PPPIO in management of pesticide are as follow:

- To prepare regulations and legislation on the management of pesticides and phytosanitary measures.

- To educate farmer and stakeholder on pesticide uses and plant protection measures.
- To supervise the Pesticide Formulation Analysis Laboratory, Pesticide Residue Analysis Laboratory and Plant Diagnostic Laboratories.

Other institutes concerned with the management of pesticides are the Department of Animal Health and Production with its responsibilities, Ministry of Commerce, Health and Environment. Moreover, there are many NGOs that take an active role in pesticide uses such as Centre d'Etude et de Development Agricole Cambodgien (CEDAC) working closely with farmers in raising awareness on side effects of pesticides and its alternatives and NGOs Forum is expanding activities to the whole country with the aim of reducing pesticide dependency.

Existing legal legislations, regulations and institutes enact to manage pesticides in Cambodia:

- Sub-decree (No. 69) on Standard and the Management of Agricultural Materials issued 28 October 1998 contains 14 articles mentioning the pesticide management procedures.
- Ministerial declaration (No. 038) on the creation of the Bureau of Agricultural Material Standard issued 21 January 1999.
- Ministerial declaration (No. 245) on the implementation of the Sub-decree No. 69 issued 21 October 2002.
- Ministerial declaration (No. 064) on Formats of Application Forms relating to Agricultural Materials issued 27 February 2003.
- Ministerial declaration (No. 522) on the Mandate of the Department of Agronomy and Agricultural Land Improvement issued 30 September 2003.
- Ministerial declaration (No. 598) on the Lists of Pesticide in Cambodia issued 15 December 2003.
- Ministerial declaration (No. 204) on Amendment of Declaration No. 064 issued 12 July 2004.
- Mutual declaration (No. 02/04) between MAFF and MoJ on Formats and Police of Justice for MAFF/DAL issued 26 October 2004.

A. Pest and pesticide management

Integrated Pest Management (IPM) program was initiated in 1993 by MAFF after a National Workshop on "Environment and IPM". In 1998 MAFF officially declared Integrated Pest and Crop Management as one of the country key crop production strategies with the aim of making IPM the standard approach to crop management. This aim to make IPM the standard approach to crop management in Cambodia, with emphasis on rice, vegetables, fruit and field crops with pursuing a policy of sustainable food production to ensure food security in Cambodia. Further, on the 4th of July 2002, MAFF issued a Ministerial declaration (Prakas) No. 205 on the establishment of an **Integrated Crop Management Program**, called "**National IPM Program**" to facilitate coordination of all IPM activities in Cambodia irrespective of donor agencies and crops involved.

Goal of IPM Program

The overall goal of the program is to improve food security through the promotion of Integrated Pest and Crop Management skills at the farm level. The National IPM program is structured under MAFF and is now working in 14 provinces with major agricultural production.

Objectives of IPM

- To reduce farmers' dependence on the agricultural chemicals, especially pesticides in agricultural production and to minimize hazards to the human health, animals and the environment.
- To develop the capacity of farmers and agricultural technical officers to conduct training and experiments to be able to identify problems and find appropriate solutions.
- To educate farmers on agricultural technologies by enhancing their monitoring and analyzing field situations enabling them to manage crops effectively.

Strategies/Approach

The program has adapted the strategy of "learning by doing" using the Farmer Field School (FFS) model and the training methods are based on the principles of non-formal adult education with emphasis on a discovery learning approach. This approach allows farmer to participate in a season long training covering one full crop cycle with intensive field practice. To support the training exercise, a crop is grown for field study activity. Farmers observe and analyze the field situation to discover the dynamic relationship between plants, pests, natural enemies, nutrients, soil, water and other components in the crop ecosystem. After thoroughly analyzing the field situation, the participants discuss findings and together make decisions about crop management. In addition, the Program coordinates with research institutions to find new agricultural technologies and good experiences in response to the needs of the farmers.

IPM training achievement

The major training activities implemented are training of trainer courses on rice, vegetables, mung bean, and water melon. Training achievements are as follow:

- Trained 636 IPM trainers
- Trained 1 602 farmer trainers
- Trained more than 86 715 farmers
- About 88 000 farmers attended field days
- Trained 920 teachers and approx. 5 000 students
- Formed 415 clubs with 8 052 farmers

(Ngin Chhay, 2004).

Pest resistance

There is insufficient research on pest resistance to pesticide in Cambodia. However, many reports concluded that insects have developed resistance to pesticides in Cambodia.

B. Testing, quality control and effects in the field

Many reports published that many agricultural materials sold in the Cambodian markets are illegally imported and fake or substandard in quality. Some of these products are pesticides banned for use in Cambodia as well as in other countries due to their harm to health and the environment. To improve this situation, the Royal Government of Cambodia (RGC) particularly Ministry of

Agriculture, Forestry and Fisheries (MAFF) introduced legislation and regulation to control pesticide in country.

On 28 October 1998 the RGC issued a Sub-decree No. 69 on Standard and the Management of Agricultural Materials aiming to guarantee consistent high quality agricultural material inputs especially for management of pesticide. Chapter III of this Sub-decree contains 14 articles, (11-24) mention about pesticide management, which was detailed in *Annex 1*.

For implementing the Sub-decree above, MAFF made a ministerial declaration (Prakas) No. 038 on the creation of the Bureau of Agricultural Material Standard to response the registration of agricultural inputs, issued 21 January 1999. Its functions and duties are described in the introduction above.

In order to implement Sub-decree No. 69 efficiently and effectively, MAFF also developed Prakas No. 245 issued in detailed guidelines for implementation on 21 October 2002. This Prakas details the procedures on how to register products, exploitation, import and export, register or revoke the permissions, packages and label, disposal of empty container, selling, prohibition of exploitation, advertisement, trader obligation, and control and management of officers.

In addition, MAFF further created a Prakas No. 064 on Formats of Application Forms relating to Agricultural Materials issued on 27 February 2003 to standardize forms used in the country. This Prakas develops unique application forms for use by all distributors or importers.

Subsequently, MAFF issued another Prakas No. 598 with Lists of Pesticide in Cambodia on 15 December 2003. This declaration contains three lists of pesticides such as pesticides banned for use (116 common names), pesticides restricted for use (40 common names) and pesticide permitted for use (136 common names) (see Annex B). In this regulation, pesticides classified as banned and restricted conform to WHO classification by hazard (Ia and Ib) and some pesticides are recently concerned with environmental pollution. Lists of pesticide are normally updated every two years.

Since Prakas No. 064 had not enough procedures to implement pesticide management properly, MAFF developed a Prakas No. 204 on Amendment of Declaration No. 064, issued 12 July 2004.

Even thought, all Prakas above still give no power to enforce pesticide management. Under the mutual declaration No. 02/04 between MAFF and Ministry of Justice (MoJ) on Formats and Police of Justice for MAFF/DAL/BAMS officers, issued 26 October 2004, officers and staff are being trained by resource persons on procedures how to take action against violation. Full implementation will be done in year 2006.

For controlling the pesticide quality, MAFF currently has one Pesticide Formulation Analysis Laboratory supervised by DAALI and implemented by PPPIO to monitor quality of pesticide products in country. However this laboratory has limited facilities and technicial capacity. Most product samples analyzed were from imported pesticides or distributors officially registering their products in MAFF/DAL/BAMS and some pesticides on sale in the markets. Only 55 samples of pesticide products were analyzed in the year 2004. On the other hand, PPPIO has further made trials on pesticide effectiveness in the field. 45 sample pesticides were tested before officially registered by MAFF/DAL/BAMS.

There is no collaboration between industries and the government to monitor pesticide use in the field, however there is a program called **"Safe and Responsible Use of Pesticide" (SARUP)** to raise awareness of farmers on pesticide application and safe protection.

C. Health and environmental information

There are still not enough data to identify the impact of pesticides to human health and the environment. Cooperation between MAFF, MoH and MoE initially conducted an inventory on POP pesticides (Persistence Organic Pollutants) focusing on the production, use, stockpile, contaminated sites in country. Result found that no production, stockpile and contaminated site of POP pesticides in country but there are some DDT and Chlordane remains on sale in the markets. However, they do not have records on the impact to human health and the environment (MoE, 2005).

Regular surveys done by PPPIO on pesticide use by farmers and pesticides on sale in the markets found that the areas of heavy use and sale of pesticides is the area located on both sides of the Mekong River and the Tonle Sap Lake. 109 common names with 419 trade names of pesticide were available in the markets in year 2004 and all farmers who grow vegetables and beans in above region used pesticide seriously (PPPIO, 2004).

Furthermore, a few survey done by local NGOs on occupational poisoning among farmers showed that 96 percent farmer interviewed had experienced at some point symptoms or signs consistent with those of acute pesticide poisoning during or shortly following the use of pesticide (CEDAC, 2004) and similar results were researched by Sodavi et al., (2000).

In addition, there is a collaboration research done by Ministry of Agriculture, Forestry and Fisheries of Cambodia and the Department of Environment Conservation, Ehime University, Tarumi, Japan on Persistent Organoclorine Residues in Marine and Freshwater Fish in Cambodia. Results showed that DDTs, HCHs, CHLs, and HCB were detected in fish samples collected from inland and coastal water. DDTs were the predominant contaminants with concentrations ranging from 0.5-25 ng/g wet wt, HCHs, CHLs and HCB accumulated at lower levels in fish ranging 0.01-0.22 ng/g, 0.1-0.34 ng/g and <0.01-0.32 ng/g respectively (In Monirith, et al. 1999).

Ministry of Environment is responsible for monitoring environmental quality (air, water, and soil), controlling environmental pollutants release, and participates in collecting, compiling, and managing data related to toxic and hazardous chemical and managing all kinds of waste in terms of a safe environment. But they have no program to monitor or research on the effect of pesticide to human health and the environment. Similarly Ministry of Health has its mandate to treat and prevent human health but they have no specific programs to monitor the impact of pesticide yet (Mandates of MoE & MoH).

Cambodia has created a National Codex Committee (NCC) to standardize all commodities for export by Sub-decree No. 05 issued on February 1998 and amended by Sub-decree No. 28 issued on March 2001. Ministry of Commerce is a focus point of this committee with other ministries as member (MoC, 1998). No progress of this committee.

D. Trends in pesticide manufacture, use and trade

It is difficult to describe the trend in pesticide manufacture, use and trade in Cambodia. So far Cambodia does not produce or export pesticides but imports predominantly from abroad with legal and illegal permissions from Viet Nam, Thailand, China, Malaysia, France, Singapore and Taiwan etc. A system has been established to registe pesticides in Cambodia as well as to collect or record data on pesticide importation. However, few data were recorded in some institutions of government.

The legal statistic recorded by MAFF/DAL/BAMS is as follows:

Pesticide imported	2005	2004	2003	Total
Commercial products (Tons)	84	**42.274**	47.500	**173.774**

In addition, there have also reported by the Ministry of Commerce, Department of CAMCONTROL recorded in year 2002 in table below:

Year 2002	Tons Commercial products	Value USA Currency
Insecticides	145.42	127 337.00
Fungicides	7.02	10 262.00
Herbicides	16.14	69 731.00
Rodenticides	29.88	18 526.00
Total	**198.46**	**225 856.00**

Besides these, pesticide importation also occurred by illegal importers along the uncontrollable borders of Cambodia. A survey done by local NGOs estimated the value of farmer expenditure at about 20 000 000 USD every year (CEDAC, 2004) and approximately 6-9 million dollars every year (Environment Justice Foundation).

E. Selected standards

Effort made by the government to reduce risks associated with pesticide in term of toxicity, packaging, labeling and application method is the establishment of legislation and regulations as mention in point B. Furthermore PPPIO conducted a program "**Safe Use of Pesticide**" which aims to provide knowledge on selection and application of pesticides in the field, and prevention of pesticide hazards to human health and the environment. In addition a collaboration with other agencies conducting a program called **"Safe and Responsible Use of Pesticide" (SARUP)** with similar objective above to expand activities in whole country. SARUP program was initially established in 1995 by the DAALI and supported by Japanese International Cooperation Agency (JICA) for two years and then the Royal Government of Cambodia decided to allocate funds to continue this important program. Moreover, Crop Life Asia has recently supported a pilot program since year 2002.

SARUP training achievement

Achievement	JICA		RGC		CropLife Asia	
	Schools	Person	Schools	Person	Schools	Person
Trainer					3	74
Farmer	63	1 953	143	4 290	50	1 571
Pesticide seller						63

(Hean Vanhan, 2004)

Moreover trainings conducted by local NGOs such as CEDAC and NGOs Forum on pesticide hazards and its alternatives to farmers who grown vegetables and cash crops located in major agricultural provinces around Tonle Sap Lake, Mekong River and areas of intensive use of pesticides along the border of Cambodia.

There are small amounts of obsolete pesticides stocked in Cambodia. Approximately 25 tons of obsolete pesticides are stored in the warehouse of DAALI and they proposed for phasing out by a project cooperated with Ministry of Environment. (DAALI, 2004).

Through existing regulations, Sub-decree 69 addressing that the disposal of waste and unwanted pesticides and empty containers should be permitted by MAFF and MoE but procedures to discard them have not been established yet. Although farmers dispose of their empty containers and left over pesticides in the field freely.

In accordance with legislation and regulations of RGC, producers or importers must follow the system of registration formatted by MAFF/DAL/BAMS. In fact 8 Prakas above continually issued are proven.

Licensing systems

- License to doing business in pesticides: Any physical or juridical person who did, does and whishes to produce, formulate, repack, stock, supply, import-export, sell and resell shall obtain the permission from MAFF/DAL/BAMS.
- License to location of warehouse: Procedure and condition for storage of pesticides shall be regulated by MAFF. The location of warehouse for pesticide shall be permitted by MAFF with agreement of MOE.
- License to disposal: The disposal of waste and unwanted pesticides and empty containers should be permitted by MAFF with agreement of MOE.
- The advertising of pesticide shall be regulated by MAFF.
- License to import pesticides: any physical or juridical person may not be allowed to import any kind of pesticide unless it has been registered and the person himself has obtained the permit from MAFF.
- The import permit is valid for a period of one year from the date of issue.
- The quantity of pesticides allowed to import shall be determined by MAFF based on storage condition, stock warehouse ability, local demand and avoiding a negative impact on the environment due to expiry, unwanted or obsolete pesticides when disposal.

Requirement for obtaining a permit/license

- Application form
- Particular of applicant with photo and certified by the Council of Commune
- Identity card of applicant
- Contract of business
- Location of premises/warehouse certified by the Council of Commune
- Certification of company registration by Ministry of Commerce

Registration of pesticides

No pesticides shall be manufactured, imported, formulated, repacked, distributed, sold or offered of sale, used unless it has been duly registered by MAFF/DAL/BAMS.

Requirements for registration

- Application form
- A copy of the permit/license from MAFF (if any)
- Technical information of product
- Quality guaranteed analysis or certificate of quality from the manufacturer
- Certificate of registration of the product in origin country and other (if any)
- Model of packing and label in Khmer
- Sample of the product for analysis and bio-efficacy trial

Pesticides are allowed to register

- Pesticides that are not listed in the current list of permitted pesticide in use in Cambodia but are currently being sold
- Pesticides that included in the list of permitted pesticide
- New pesticides that do not belong to class I (WHO)
- Registered pesticides with changes in formulation or trade name

Pesticides are not allowed to register

- Pesticides are in the list of banned pesticide
- Pesticides are belong to class I of WHO except in emergency or special purposes as determined by MAFF
- Pesticides are imported without permission from MAFF

Types of pesticide registration

1. **Provisional registration** shall be granted to all pesticides listed in the provisional clearance by the MAFF and are sold in the market.
2. **Conditional registration** is granted when there are data requirements or conditions that are still to be met by the applicant, such as results of local efficacy studies and/or on the acceptability of the pesticide in terms of quality and indication of safety as required by the MAFF.
3. **Full registration** is granted when the applicant has satisfactorily completed all the technical requirements regarding bio-efficacy, protection of the environment, safety in humans and animals.
4. **Experimental use permit** is a permit granted to research institutions the importation of unregistered pesticide for research purposes.

Validity of pesticide registration certificate

- Provisional registration is valid for a period of one year
- Full registration is valid for a period of three years
- A renewal for similar period maybe obtained after submitting the appropriate fee and additional data when required
- Failure to renew registration will mean automatic cancellation of such

Pesticide Control

- Inspector team (Police of Justice)
- Facilities
- Control:
  1. Business and import license
  2. Quality standard
  3. Adulterated pesticides
  4. Damaged/obsolete pesticides with lack of effectiveness caused by prolonged or improper storage condition or expiry
  5. Pesticides are not registered or registered without registration number on label
  6. Pesticide are in conditional registration and experimental use permit
  7. Pesticides are illegally imported
  8. Pesticides are bearing label in foreign languages
  9. Storage and display of pesticides
  10. Any premises and its compound, warehouse, transport, and farms when suspect of violation on the sub-decree 69
  11. Take any suspected pesticide for analysis
  12. Monitoring the banned pesticides in the market
  13. Monitoring the disposal of pesticide

Punishment

- Any physical or juridical person violating the registration of pesticides shall be given a warning and the product shall be confiscated. The punishment shall be determined by court.
- Any physical or juridical person violating the permission of MAFF shall be given a warning and forced to correct within 7 days. The product shall be confiscated and punishment shall be determined by court for second offence.

Penalties

- Any physical or juridical person who fails to do business adulterated or not in conformity to the guaranteed analysis in the registration shall be given a warning and the product shall be confiscated. The punishment shall be determined by court. Fully revocation of permission for second offence.
- Any physical or juridical person violating the packaging standard shall be given a warning and forced to correct within 15 days. Provisional revocation of permission for second offence.
- Any physical or juridical person who fails to provide safe handling, proper transport, storage or disposal of pesticide without permission from MAFF shall be given a warning and forced to correct within 7 days. Provisional revocation of permission for second offence.

Conclusions

- Regulations (Sub-decree and Prakas) have been issued and a pesticide registration scheme is being established.
- Plans have been developed for the enforcement of pesticide legislation, but still need to be implemented.
- Cambodia does not produce pesticides and all agricultural chemicals must be imported, and there are no important agrochemical distributors in the country.
- Many pesticides remain available on the Cambodian market place illegally and majority of pesticide imports are uncontrolled with most labels not in the national language as the same time as Sub-decree 69 issued lists of pesticide in Cambodia such as permitted, restricted and banned.
- National IPM program is operational and growing and and has resulted in a clear reduction in pesticide use.
- DAALI is establishing a pesticide formulation analysis laboratory to control current concerns about the quality of many pesticides on the local market and pesticides registered in MAFF.
- Plans exist for the establishment of pesticide residue analysis laboratory at MAFF.
- Broad recognition throughout government of the existence of health and environmental issues associated with current pesticide use practices.
- There is very limited data on actual health and environmental effects of current pesticide use practices but there have been some data on occupational poison among pesticide users.
- Drinking water and food crops are currently not tested for pesticide residues. In the absence of such testing, there remains uncertainty about the food safety situation.

Comments

- Design and implement a program to enforce the requirements of Sub-decree 69 and Prakas. This would require strengthening of capacities at BAMS. Priorities include ending the sale of banned pesticide, and ensuring labels in the national language.
- National importers/distributors of pesticide should ensure that labels in national language are attached to individual packages.
- Licensing system was developed and introduced to pesticide importers/distributors. In order to obtain a license the importer or distributor should:
  - Understand the legal requirements of the relevant Sub-decree and Prakas
  - Abide to the requirements of Sub-decree and Prakas. They should not import or distribute products that are on the government list of banned pesticide.
  - Importers should have appropriate pesticide storage facility.
  - Distributors should have basic knowledge about products, risks and proper management of products.
- Organize workshops for importers/distributors to understand the legal requirements and procedures.

- DAALI, National IPM and NGOs should step-up awareness of farmers regarding risks of pesticides through media campaigns.
- Strengthening capacities of facilities and staff of pesticide formulation laboratory to operate well-functioning laboratory in MAFF.
- Establishment of well-functioning pesticide residue laboratory in MAFF and aim for a national reference laboratory that can be used by the various ministries.
- Ministry of Health should be enabled to play a more significant role in researching and addressing pesticide associated health problems. The establishment of a Poison Control Center that provides instant advice on the treatment of poisoning cases would be a step forward.
- Ministry of Environment should be increased capacity to research pesticide hazards to the environment including the prevention of run-off of agricultural pesticides into waterway and management of obsolete pesticides.
- Strengthen international collaboration to align pesticide regulations with international requirements and measures taken in neighboring countries.

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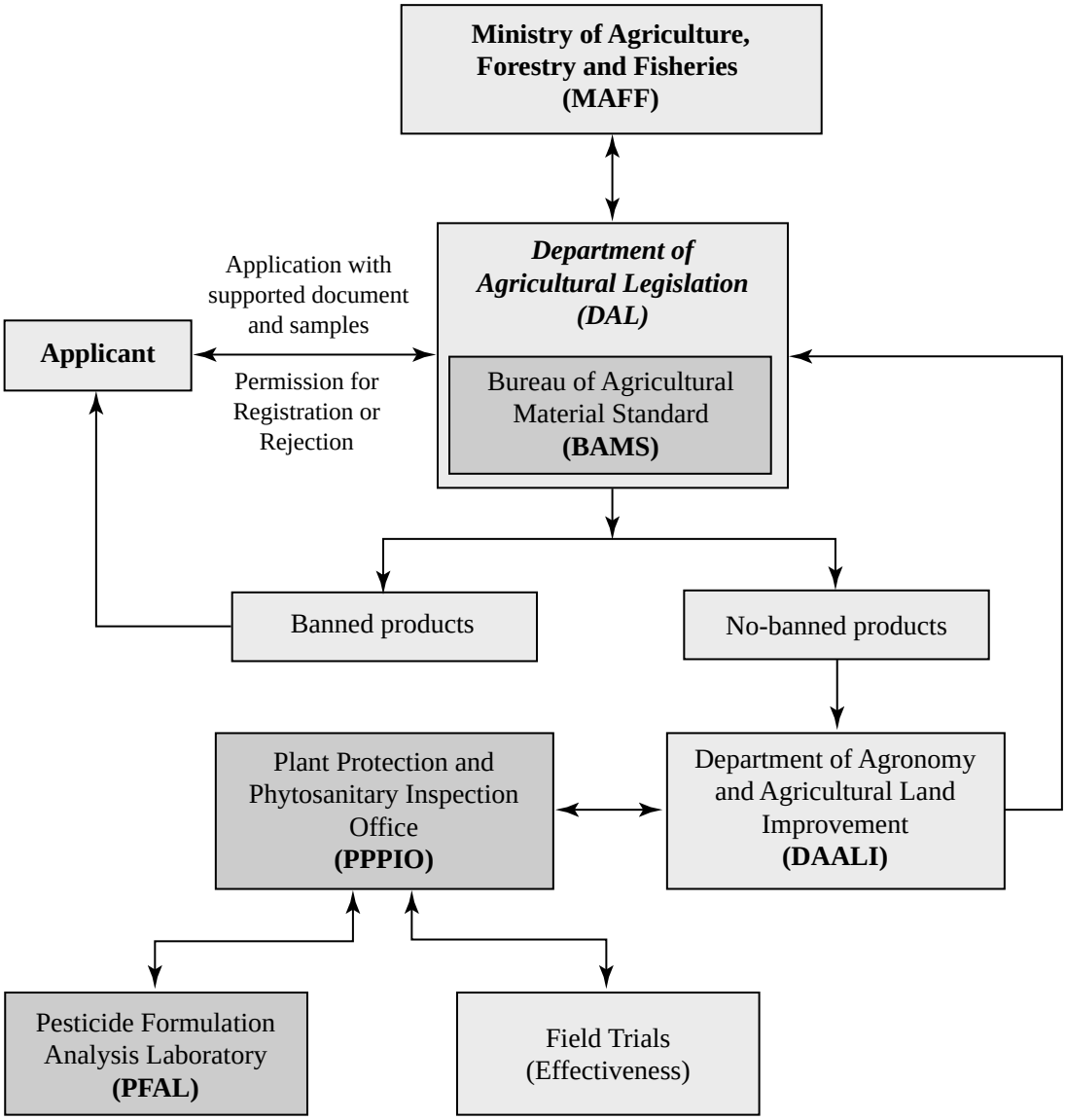
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Flow of Pesticide Registration in Cambodia



Cambodia Annex 1

Sub-decree 69 on the Standard and Management of Agricultural Materials

Chapter III. Pesticides

Article 11. No pesticides shall be imported, manufactured, formulated, repackaged, distributed, sold or offered for sale, or used unless it has been duly, registered or given provisional clearance by the MAFF.

Article 12. Any physical or juridical person who did, does and whishes to do business in pesticide should register their product and obtain the permit in MAFF.

Article 13. The following products must be registered with the MAFF:

1. Pesticides that are not listed in the current MAFF list of permitted pesticide in use in Cambodia but are currently being sold.
2. Pesticides those are included in the MAFF list of permitted pesticides.
3. New pesticides that do not belong to class I, according to WHO classification.
4. Registered pesticides with changes in formulation or trade name.

Article 14. Pesticides which are included in the MAFF list of banned pesticides, pesticides imported without permission from MAFF and pesticides belonging to Toxicity/ Hazard Class I, according to WHO classification are not allowed for registration, except in case of emergency or for special purposes as determined by the MAFF.

Article 15. There are 4 types of pesticides registration:

1. **Provisional registration** shall be granted to all pesticides listed in the provisional clearance by the MAFF and are sold in the market.
2. **Conditional registration** is granted when there are data requirements or conditions that are still to be met by the applicant, such as results of local efficacy studies and/or on the acceptability of the pesticide in terms of quality and indication of safety as required by the MAFF.
3. **Full registration** is granted when the applicant has satisfactorily completed all the technical requirements regarding bio-efficacy, protection of the environment, safety in humans and animals.
4. **Experimental use permit** is a permit granted to research institutions the importation of unregistered pesticide for research purposes.

   A provisional or conditional registration shall be converted into full registration status within on year when conditions and requirements have been met satisfactorily. Extension for another year may be granted for valid reasons.

Article 16. Full registration shall be valid for a period of 3 years, unless earlier revoked or cancelled. A renewal for similar period may be obtained after submitting the appropriate fee and additional data when required. Failure to renew registration will mean automatic cancellation of such.

Article 17. The MAFF is empowered to charge fee for registration and renews with agreement of Ministry of Economy and Finance.

Article 18. Every container or package of pesticide offered for sale, storage and use shall bear a label printed in Khmer language and easy to understand. The format and characteristic of the label should comply with the labelling standard prescribed by MAFF.

Article 19. Pesticide container and related outer packaging should comply with the standards and regulations prescribed by MAFF.

Article 20. Repacking of a pesticide is prohibited, unless it has been permitted by MAFF. Decanting or dispensing of any pesticide in food or beverage containers is prohibited.

Article 21. Importation, production and sale of adulterated pesticide, damaged pesticide or pesticide which does not contain the quantity and type of active ingredient declared on the label or pesticide listed in conditional registration are prohibited.

Article 22. Procedures and conditions for storage of pesticides shall be regulated by MAFF. The location of warehouse for pesticide shall be permitted by MAFF with agreement of the Ministry of Environment.

Article 23. The disposal of waste and unwanted pesticides and empty containers should be permitted by MAFF with agreement of the Ministry of Environment.

Article 24. The advertising of pesticide shall be regulated by the MAFF. Only pesticides, which are fully registered, may be advertised.

Cambodia Annex 2

LIST OF PESTICIDES BANNED FOR USE IN THE KINGDOM OF CAMBODIA

No.	COMMON NAMES	USE	WHO Toxicity Class	Family
1	1, 1, 2, 2-Tetrachloroethane	FM		Org
2	2, 4, 5-T	H	O	OC
3	2, 4, 5-TP (Fenoprop)	H	O	OC
4	Aldicarb	I	Ia	CA
5	Aldoxycarb (Aldicarb sulfone)	I	O	
6	Aldrin	I	O	OC
7	Aminocarb	I	O	Org
8	Amitraz	I	O	Triazapentadiene
9	Antu	R	O	CA
10	Aramite	I	O	OC
11	Arsenic compound (AS)	F		AS
12	BHC/HCH, Lindane	I	II	OC
13	Binapacryl	I, F	O	Org
14	Bis(tributyltin) oxide		O	
15	Bromophos	I	O	OP
16	Bromophos-ethyl	I	O	OP
17	Cadmium compound (Cb)	F		Inorg
18	Calcium arsenate	I	Ib	AS
19	Calcium cyanide	FM	Ib	Inorg
20	Camphechlor	I	O	OC
21	Captafol	F	Ia	OC
22	Captan	F	Un	Phtgalimide derivative
23	Carbophenothion	I	O	
24	Chlordane	I	II	OC
25	Chlordecone	I	O	OC
26	Chlordimeform	I	O	Formamidine
27	Chlorfenvinphos/CVP	I	Ib	OP
28	Chlormephos	I	Ia	OP
29	Chlorthiophos	I	O	OP
30	Coumaphos	AC	Ia	OP
31	Crimidine	R	O	
32	Crotoxyphos	I	O	
33	Cyanthoate/Tartan	I	O	OP
34	Cycloheximide	PGR	O	Org
35	Cyhexatin	I	III	OT
36	Cytokinin (Zeatin)	PGR		Antibac
37	Daminozide	PGR	Un	Org
38	DBCP (Dibromochloropropane)	FM	O	OC
39	DDT	I	II	OC

No.	COMMON NAMES	USE	WHO Toxicity Class	Family
40	Demephion	I	O	OP
41	Demeton	I	O	OP
42	Demeton-S-methyl	I	Ib	OP
43	Diamidafos	N	O	
44	Dieldrin	I	O	OC
45	Dimefox	I	O	
46	Dimetilan	I	O	
47	Dinoseb/Dinosebacetate, amine	H	O	Dinitrophenol
48	Dinoterb	H	Ib	NP
49	Dioxathion	I	O	OP
50	Disulfoton/Ethylthiodemeton	I	Ia	OP
51	DNOC	I	Ib	NP
52	Edifenphos	F	Ib	OP
53	Eldrine/Endrine/Nendrine	I	O	OC
54	Endosulfan	I	II	OC
55	Endothion	I	O	
56	EPN	I	Ia	OP
57	Ethoprop/Ethoprophos	I	Ia	OP
58	Ethylene dibromide	FM		Org
59	Ethylene dichloride	FM		Org
60	Ethylene oxide	FM		Org
61	Fenamiphos	N	Ia	OP
62	Fensulfothion	I	O	OP
63	Fentin (Fenbutatin oxide)	I	Un	OT
64	Fluoro acetamide	R	Ib	Org
65	Fonofos	I	Ia	OP
66	Fosthietan	N	O	OP
67	Heptachlor	I	II	OC
68	Hexachlorobenzene	F	Ia	OC
69	IPSP	I	O	
70	Isobenzan	I	O	OC
71	Isodrin (Isomer of Aldrine)	I	O	
72	Isoxathion	I	Ib	OP
73	Lead arsenate	I	Ib	AS
74	Lead compound (Pb)			Inorg
75	Leptophos	I	O	OP
76	MCPB	H	III	OC
77	Medinoterb acetate	H	O	
78	Mephosphoslan	I	O	OP
79	Mercaptophos	I	O	OP
80	Mercury compound (Hg)	F		
81	Methacarbate		O	
82	Methamidophos	I	Ib	OP
83	Methidathion	I	Ib	OP

No.	COMMON NAMES	USE	WHO Toxicity Class	Family
84	Methomyl	I	Ib	CA
85	Mevinphos	I	Ia	OP
86	Mirex	I	O	OC
87	Monocrotophos	I	Ib	OP
88	Nitrilacarb		O	
89	Nitrofen	H	O	Nitrophenol
90	Oxamyl	I	Ib	CA
91	Oxydeprofos (ESP)	I	O	
92	Paraquat	H	II	BP
93	Parathion (Parathion-ethyl)	I	Ia	OP
94	Parathion-methyl	I	Ia	OP
95	Pentachlorophenate de sodium	F	Ib	OC
96	Pentachlorophenol/PCP	I, F, H	Ib	OC
97	Phenothiol	H	III	OC
98	Phorate	I	Ia	OP
99	Phosfolan	I	O	OP
100	Phosphamidon	I	Ia	OP
101	Prothoate	I	O	OP
102	Schradan	I	O	OP
103	Scilliroside/red squill	R	O	Org
104	Selenium compound (Se)	F		
105	Sodium chlorate	H	III	OC
106	Sodium compound	F		
107	Sodium fluoroacetate	R	Ia	Org
108	Strobane (tepene polychlorinated)	I		
109	Sulfotep	I	Ia	OP
110	Talinum compound	R	O	Inorg
111	TEPP	I	O	OP
112	Terbufos	I	Ia	OP
113	Thionazin	I	O	OP
114	Triamiphos	F, I, AC	O	
115	Triazophos	I	Ib	OP
116	Trichloronat	I	O	OP

LIST OF PESTICIDES RESTRICTED FOR USE
IN THE KINGDOM OF CAMBODIA

No.	COMMON NAMES	USE	Toxicity Class	Family
1	Acrolein	H	Ia	Org
2	Alachlor	H	Ia	Acetanilide
3	Allyl alcohol	H	Ib	
4	Aluminium phosphide	FM		IP
5	Azinphos-ethyl (Triazotion)	I	Ib	OP
6	Azinphos-methyl (Metiltriazothion)	I	Ib	OP
7	Azocyclotin	AC	II	OT
8	Blasticidin-S	F	Ib	
9	Brodifacoum	R	Ia	CO
10	Bromadiolone	R	Ia	Anticoagulant
11	Bromoxynil/Ioxynil	H	II	Org
12	Buto carboxim (Butacarboxim)	I	Ib	CA
13	Carbofuran	I	Ib	CA
14	Chloropicrin	FM		IC
15	Dichlorvos/DDVP	I	Ib	OP
16	Dicofol	AC	III	OC
17	Dicrotophos	I	Ib	OP
18	Diphacinone	R	Ia	Anticoagulant
19	Fenthion	I	II	OP
20	Flocoumafen	R	Ia	Anticoagulant
21	Flucythrinate	I	Ib	PY
22	Formetanate	I	Ib	CA
23	Heptenophos	I	Ib	OP
24	Isazofos	I-S	Ib	OP
25	Isofenphos	I	Ib	OP
26	MAFA	F	III	Org
27	Magnesium phosphide	FM		IP
28	Mecarbam	I	Ib	OP
29	Methyl bromide	FM		AB
30	Nicotine	I	Ib	Org
31	Omethoate	I	Ib	OP
32	Oxydemeton-methyl	I	Ib	OP
33	Pirimiphos-ethyl	I	Ib	OP
34	Propaphos	I	Ib	OP
35	Propetamphos	I	Ib	OP
36	Strychnine	R	Ib	
37	Thiofanox	I-S	Ib	CA
38	Thiometon	I	Ib	OP
39	Vamidothion	I	Ib	OP
40	Zinc phosphide	R	Ib	IP

LIST OF PESTICIDES PERMITTED FOR USE
IN THE KINGDOM OF CAMBODIA

No.	COMMON NAMES	USE	WHO Toxicity Class	Family
1	1-naphthylaceticacide	PGR	Un	Org
2	2, 4-D	H	II	PAA
3	Abamectin	I	III	Bio pesticide
4	Acephate	I	III	OP
5	Acrinathrin	I	Un	PY
6	Alpha-cypermethrin	I	II	PY
7	Ametryn	H	III	TD
8	Amitraz	I	III	OP
9	Anilofos	H	II	OP
10	Atrazine	H	Un	Triazine
11	Azadirachtins	I	III	BP
12	Bacillus thuringiensis	I	III	Baterium
13	Benfuracarb	I	II	CA
14	Benomyl	F	Un	Org
15	Bensulfuron	H	Un	Org
16	Beta-cyfluthrin	I	II	PY
17	Bromacil	H	Un	Org
18	Bromuconazole	F	II	Triazole
19	Buprofezin	I	III	TC
20	Butachlor	H	Un	OC
21	Butralin	H	III	Dinitroaniline
22	Calcium polysulfide	F	II	Inorg
23	Carbaryl	I	II	CA
24	Carbendazim	F	Un	
25	Carbosulfan	I	II	CA
26	Cartap	I	II	CA
27	Chlomethoxyfen (Chlomethocynil)	H	Un	OC
28	Chlorfenapyr	I	II	OC
29	Chlorothalonil	F	III	Chloronitrile
30	Chlorpyrifos	I	II	OP
31	Cinmethylin	H	Un	Cineol
32	Clomazone	H	Un	
33	Copper hydroxide	F	III	CU
34	Copper oxychloride	F	III	CU
35	Copper sulfate	F	II	CU
36	Coumatetralyl	R	Ib	Anticoagulant
37	Cyfluthrin	I	II	PY
38	Cypermethrin	I	II	PY
39	Cyproconazole	F	III	Azole
40	Dalapon	H	Un	
41	Deltamethrin	I	II	PY
42	Diafenthiuron	I	Un	TU
43	Diazinon	I	II	OP
44	Difenoconazole	F	III	OC
45	Dimethoate	I	II	OP

No.	COMMON NAMES	USE	WHO Toxicity Class	Family
46	Diniconazole	F	III	OC
47	Diuron	H	Un	
48	Epoxiconazole	F	III	Triazole
49	Esfenvalerate	I	II	PY
50	Ethephon	PGR	Un	Org
51	Ethofenprox	I	II	OC
52	Fenitrothion	I	II	OP
53	Fenobucarb/BPMC	I	II	CA
54	Fenpropathrin	I	II	PY
55	Fenthion	I	II	OP
56	Fenvalerate	I	II	PY
57	Fipronil	I	II	PY
58	Fluazifop-p-butyl	H	III	Org
59	Flufenoxuron	I	Un	CU
60	Flusilazole	F	III	Triazole
61	Flutriafol	F	III	Triazole
62	Folpet/Folpel	F	Un	Org
63	Fosetyl	F	III	Org
64	Fthalide	F	III	Reductase
65	Gibberellic acid	PGR	Un	Org
66	Glufosinate	H	III	OP
67	Glyphosate/IPA Salt	H	Un	OP
68	Hexaconazole	F	Un	Triazole
69	Hexythiazox	I	Un	OC
70	Imibenconazole	F	Un	Triazole
71	Imidacloprid	I	II	Fichlomicotmile
72	Iprobenfos	F	III	OP
73	Iprodione	F	Un	Org
74	Isoprocarb	I	II	CA
75	Isoprothiolane	F	III	Org
76	Kasugamycin/Fthalide	F	Un	Org
77	Lambda-cyhalothrin	I	II	PY
78	Linuron	H	Un	SU
79	Lufenuron	I	II	BC
80	Malathion	I	III	OP
81	Mancozeb	F	Un	DC
82	Maneb	F	Un	DC
83	MCPA	H	III	Phenoxy
84	Mecoprop	H	III	Phytohormone
85	Metiram	F	Un	CA
86	Metolachlor	H	III	Chloracetanilide
87	Metribuzin	H	Un	Triazinon
88	Metsulfuron	H	Un	Org
89	Molinate	H	II	TC
90	Monosultap	I	III	
91	Naled/Bromchlophos	I	II	OP
92	Nereistoxin/Dimehypo	I	II	Pyridine

No.	COMMON NAMES	USE	WHO Toxicity Class	Family
93	Oxadiazon	H	Un	Oxadiazole
94	Oxolinic acid	F, B		Org
95	Pencycuron	F	Un	Phenylurea
96	Pendimethalin	H	III	Org
97	Permethrin	I	II	PY
98	Phenthoate/Dimephenthoate	I	II	OP
99	Phosalone	I	II	OP
100	Pretilachlor	H	Un	
101	Prochloraz	F	III	CA
102	Procymilone	F	Un	OC
103	Profenofos	I	II	OP
104	Propanil	H	III	Anilide
105	Propargite	I	III	OP
106	Propiconazole	F	II	OC
107	Propineb	F	Un	CA
108	Pyraclofos	I	II	OP
109	Pyrazosulfuron	H	Un	CA
110	Pyridaphenthion	I	III	OP
111	Quinalphos	I	II	OP
112	Quinclorac	H	Un	OC
113	Rotenone	I	II	PY
114	Sethoxydim	H	III	CO
115	Simazine	H	Un	Triazin
116	Sodium Ortho-nitrophenolate + Sodium para-nitrophenolate + Sodium 5 + nitroguaiacolae	PGR		Org
117	Spinosad	I	III	Bio pesticide
118	Sulfosate	H	III	Org
119	Sulphur	F	Un	Inorg
120	Tebuconazole	F	Un	OC
121	Tebufenozide	I	III	PGR
122	Thiamethoxam	I	III	Org
123	Thiobencarb (Benthiocarb)	H	II	TC
124	Thiodicarb	I	II	CA
125	Thiophanate-methyl	F	Un	CA
126	Thiram (Thiuram, TMTD)	F	III	CA
127	Tralomethrin	I	II	PY
128	Triadimefon	F	III	Triazole
129	Triadimenol	F	III	Triazole
130	Trichlorfon/Chlorophos	I	III	OP
131	Tricyclazole	F	II	Triazole
132	Tridemorph	F	II	Org
133	Validamycin	F	Un	OP
134	Virus+Bacillus thuringiensis	I	II	Bacterium
135	Warfarin	R	Ib	Anticoagulant
136	Zineb	F	Un	CA

QUESTIONNAIRE SUMMARY

Cambodia

Selected Country Statistics:

Agricultural Population	**9.6 million**	**Agricultural Land**	**3.8 million ha**
GDP $4 299 million	Agric. GDP: 35.6%	GNI per capita: $310	Hunger: 33%
FAOSTAT Pesticide Data	Export	Import: $0.76 million	Use:

GDP = Gross Domestic Product; GNI = Gross National Income; Hunger = Population below minimum energy requirement; FAOSTAT = latest data entry between 1998 and 2002

Institutional Profile

Ministry	**Legislation**	**Registration**	**Licensing**	**Enforcement**	**Testing**	**Training**	**Monitoring**	
							Environm.	**Health**
Agriculture	DAL, DAALI	BAMS		BAMS	PPPIO	DAE, PPPIO		
Environment								
Health								

Industry Associations:
Non-Governmental Associations: CEDAC, SRE KHMER, NGO Forum

A. Pest and Pesticide Management	
IPM policy declared?	**Yes**
IPM mentioned in…	
Crop Protection Policy?	**Yes**
Agric. Sector Policy?	**Yes**
Other laws/documents?	
National IPM Program?	**Yes**
Dept: **DAALI**	
IPM extension projects?	**Yes**
IPM research projects?	**Yes**
Pest resistance problems?	--

B. Testing, Quality Control and Effects	
Laws for pesticide specifications?	**Yes**
Low quality products in market?	**Yes**
Quality control laboratory?	**Yes**
Own analyses in 2004: **55**	
Outside analyses in 2004:	

C. Health and Environmental Information	
Data on pesticide poisoning cases?	--
occupational exposure cases:	
accidental exposure cases:	
intentional/suicide cases:	
Pesticide poison facilities?	--
Number of facilities:	
Poison Information and Control Centers?	--
Number of centers:	
Significant environmental contamination?	**?**
Data on effects on wildlife & ecosystems?	--
Pesticide residue monitoring system?	--
Number of analyses 2004:	

D. Pesticide Manufacture, Use and Trade		
Pesticide Volume	*Tons*	*$'000 Value*
Imports	**39**	
Manufacture		
Exports		
Sales		
Pesticide Use Profile	*Tons*	*$'000 Value*
Agriculture (total)	**198**	**226**
Insecticides	73%	
Fungicides	3%	
Herbicides	8%	
Other	15%	
Veterinary		
Public Health		
Household		
Other		
TOTAL		

E. Selected Standards of Code of Conduct	
Illegal trade estimates?	--
Estimated amount 2004	
Collection of old containers and pesticides?	--
Inventory of outdated/obsolete products?	--
Operational pesticide registration system?	**Yes**
Violations in 2004	
Existing facility licensing system?	
Inspections in 2004	
Highly toxic products restricted?	**Yes**

Questionnaire responses: Yes = Yes; -- = No; ? = don't know; (blank) = no answer

CHINA

by Jianping Qui

Introduction

Beginning with the production of chlorinated hydrocarbons in the late 1950s, the Chinese pesticide industry has developed greatly, making remarkable progress especially in the recent decade, and now has formed a completed system including pesticide R&D, intermediate materials and formulation production. There are about 2 600 pesticide producers (including those producing public health insecticides) in China, with a production capacity of 850 000 tons (counted in 100 percent) of over 600 varieties, 800 000 tons of formulation and over 20 000 formulated products, becoming the largest consumer and the second largest producer country in the world.

The management of pesticides in China is divided into four parts: Pesticide Registration, Pesticide Production, Pesticide Standards and Pesticide Market Supervision.

Pesticide registration

According to the Regulation on Pesticide Administration, agriculture administration is responsible for the pesticide registration and supervision in the whole country. The Evaluation and Adjudication Committee of Pesticide Registration is made up of administrative and technical experts from the following ministries:

- Ministry of Agriculture (MOA)
- Ministry of Health (MOH)
- State Environmental Protection Administration (SEPA)
- National Development and Reform Commission (NDARC)
- State Forestry Administration (SFA)
- General Administration of Quality Supervision Inspection and Quarantine (GAQSIQ)
- All-China Federation of Supply and Marketing Cooperatives (AFSMC)
- State Administration for Industry and Commerce (SAIC)
- Customs

The committee has a meeting at least once a year to discuss the full registration of pesticides to a new a.i. and other important management affairs. In these departments, MOA, MOH, SEPA, NDARC and AFSMC are the major five important departments.

The Institute for the Control of Agrochemicals, Ministry of Agriculture (ICAMA) was established in 1963, directly under the Ministry of Agriculture of China, which is responsible for the detailed affairs of pesticides registration and management in the whole country with the following principal responsibilities: pesticides registration, quality inspection, biology test, residue test, market supervision, information service, technical exchange, foreign cooperation and consultation. So it is the most important institute for pesticides management in China.

There are nearly 100 staff, and about 80 percent of them are professional personnel. It owns laboratories of more than 4 000 square meters, which are well equipped with advanced instruments,

and are capable to do various tests of pesticides. ICAMA is also the National Center for the Pesticide Quality and Supervision and Testing.

At present, almost every province and municipality directly under the Central Government and autonomic administration regions has established "Institutes for the Control of Agrochemicals" (ICAs or ICAP) which are responsible for primary evaluation of pesticide registration and other detailed affairs of market supervision and management, conducting tests and evaluations of pesticide quality, efficacy and residue, training and guiding pesticide enterprises in there provinces. Up to now, the total personnel in pesticide management is more than 30 000.

Pesticide production

The State performs a licensing system for pesticides production. The administrative department of National Development and Reform Commission (NDARC) is responsible for issueing Production Licenses and approval documents.

Pesticide standards

General Administration of Quality Supervision Inspection and Quarantine (GAQSIQ) is responsible for managing the National standard and Industry standard of pesticides.

Pesticide market supervision

Both GAQSIQ and SAIC are also involved in the supervision of pesticide quality management besides the MOA. The pesticide advertisements are evaluated and inspected by MOA and SAIC.

Rules and regulations

The principal rule of pesticides management in China is the *Regulation on Pesticide Administration,* issued on May 8, 1997 by the State Department. The Regulation regulated the pesticide registration and all the pesticides produced in China or imported to China must be granted for registration. The Regulation also requires production licensing which means the pesticide production in China must obtain Production License or approval document. In November 29, 2001, the Regulation was revised to meet the requirements of entering WTO. In July 2004, the Regulation was revised again to include the definition of Me-too. There also are some laws and rules concerning pesticides management, such as *Product Quality Law, Standardization Law, Advertisement Law, Regulation on Hazardous Chemicals Management,* etc.

The related local governments and departments also established relevant rules and regulations to comply with the *Regulation on Pesticide Administration.* Every province, municipality directly under the Central Government and autonomic administration regions issued its local *Regulations on Pesticide Administration.* MOA and former Ministry of Chemical Industry established and issued *Implementation Procedure Regulation on Pesticide Administration* respectively in 1999 and 1998. MOA and State Administration for Industry and Commerce (SAIC) jointly issued *Pesticide Advertisement Inspection Measures* in 1995. MOA and Ministry of Health (MOH) issued *Guideline on Pesticide Safe Use* to specify and harmonize with *Regulation on Pesticide Administration.* Up to now, China has formed a legal system of pesticides management.

Technical norms

Pesticides management is a systematic programs, it includes the inspection and management of product quality, safety and efficacy, packaging, transportation, storage and use. The concerned departments established standards and guidelines and other technical norms to regulate and instruct pesticide production, use and management.

At present, China has made various formulation standards of pesticide products, including nearly 180 national and industry standards and 15 000 enterprises standards of product quality. According to pesticides management rules of FAO/WHO and some developed countries, *Data Requirements of Pesticide Registration, Guideline on Pesticide Field Efficacy Trial, Guideline on Pesticide Residue Trials, Guideline on Pesticide Environment Safety Evaluation Trial, Pesticide Registration Toxicity Trial Methods, Pesticide Toxicity Evaluation Procedures* and other national and industry technical standards are issued so as to standardize pesticide registration trials (tests) and guide registration evaluations. *General Rules of Pesticide Packaging, Sampling Methods of Commercial Pesticides, Check Rules of Commercial Pesticides, General Rules of Pesticide Labels, Toxicity Classification and Signs of Pesticide Formulation, Names and Codes of Pesticide Formulation* and other related standards are stipulated to guide pesticide registration and relevant management. *Guideline on Safe and Rational Use of Pesticides* and such national technical guidance are published to instruct safe, scientific and rational use of pesticides. All these standards and rules are in line with FAO/WHO standards.

A. Pest and pesticide management

In general, there is currently no national IPM Law in China. The IPM is mentioned in the *Pronunciamento of IPM* in 1975 and *Regulations on Pesticide Administration* in 1997. Though the Agriculture Department has promoted IPM projects for many years, it should be formally named in the prospective *Plant Protection Law.*

IPM has had a great success with the control of rice roller moth and cotton boll worm; other successful cases were on vegetable, maize, forest, etc.

There are three main points that limit the promotion of IPM, as below:

- The first point is the limitation of agriculture technical extension system to the farms in the village;
- The second is the farmers don’t think the IPM project can give them benefit and save money if they haven’t carry out IPM.
- The third is the limited farmland to the farmer. In China, every farmer has no more than one tenth hectare farmland on average, so it is difficult to actualize the IPM project.

For some pest control, especially for some insects, have the significant problem with the resistance, such as cotton boll worm, diamond-back moth, some kinds of aphids, etc. So the government and industry suggest to farmers to use different kinds of pesticides, recommend new a.i. and provide them the mix-formulation. More than half the pesticides in the market are mix-formulations, such as OPs-CARBs, OPs-PYs, etc. But China government does not allow tank-mixture formulation to apply for the registration by now.

B. Testing, quality control and effects in the field

In general, the quality of pesticides is improving in recent years due to government supervision and the development of the industry. 70-80 percent products are eligible according to a selective survey of the market. MOA has a strong system to supervise the quality of pesticides in the market almost in very county. Agriculture department of province has the right to punish the poor quality (e.g. specification, package, label, period of validity, etc.) of pesticides or illegal (e.g. non-registration products). GAQSIQ and SAIC are also govern the market supervising and punishment.

The standards of pesticides product, not only national standards and industry standards, but also enterprise standards are all evaluated by ICAMA, and all the standards are met or are more strict than FAO specifications. So, the China pesticides standards were drafted with reference of FAO specifications, but not comply with relevant FAO specifications.

There are two national laboratories (National Center for the Quality Supervision & Test of Pesticides) for monitoring pesticide quality, and one is located in ICAMA, the other is located in a Chemical Industry Research Institute. There are two or more laboratories in every province for the test and supervising the quality of pesticides produce or sale in their province. In all the laboratories, HPLC or GC is equipped. In the ICAMA's laboratory, HPLC, GC, GC-MS, HPLC-MS, GC-IR, etc. are equipped.

There are limits to the collaboration between the industry and the government to monitor pesticide use in the field. Only a few enterprises developed new analytical methods and introduced them to the government by now. In fact, the main analytical methods to check the pesticides and supervise the quality are coming from the registration data. All the enterprise standards are required to update every three years by the *Product Quality Law,* so ICAMA can get the renewed enterprise standards at any time.

C. Health and environmental information

MOH is in charge of the health of plant workers and the users (farmers). The main problem in factories is dust-contamination, especially for WP formulation. In the process of manufacture (include mixing raw material and packing), the workers deposit the product randomly, they contact the chemicals frequently and lack decontamination equipment and respirators. Farmers are used to store a small quantity of pesticide in their house, so it is very dangerous to children and livestock. When using the pesticide in the field, the farmers also lack personal safety equipment, such as respirator, exposure suit, gloves, veil, etc. MOH has published the data on pesticides poisoning, there were 2 044 cases of occupational poisoning and 5 cases of death in 2003 (No data was published in 2004).

SEPA is in charge of the supervising of environmental contamination on pesticides. All the poisonous chemicals must be registration on SEPA by the law and most of pesticides are poisonous, so it is consider that many pesticides should be registration on SEPA. The contamination by using pesticides is a problem in certain areas. I have no data on the national, but there are some cases on pesticides, which have been noticed by the government.

1. Fipronil is highly toxici to fish and shrimp:

   After the farmer used fipronil in rice field, the fish and shrimp, which were breed near to the field, are killed in a short time. According to the investigation by government, plant, institutes, a guideline for safely use of Fipronil was published.

2. Carbofuran is highly toxic to red-crowned crane and other birds:

   Carbofuran only be permitted manufacture to granule and seed treatment formulation in China, but they are temptingly to birds. Many red-crowned cranes have been killed for the using of Carbofuran near to the habitat in these years (Note: Red-crowned crane is a kind of Class I protected bird in China). The ICAMA are organizing a project to research how to safely use of Carbofuran to birds.

3. Aldicarb is highly toxic and has high risk to under-ground water.

   Because of the characterization of high soluble in water, Aldicarb is forbidden to be used the area of high level of under-ground water. According to the test and investigating, the government allows the Aldicarb can be use on some crops and in some certain area.

MOA has published *The Guideline for Safety Application of Pesticides.* It regulates nearly 400 residue limits including about 170 a.i. on more than 20 crops. As a National Standard, it administers to monitor the safe use of pesticides, food residue and import/export farm product inspection. There are 54 test units that are empowered to undertake the residue tests for the pesticide registration. Almost every province has 1-2 Province Centers or MOA's Centers to monitor the safe use of pesticides, food residue and import/export farm production inspection. The main instruments are HPLC and GC. There is one National Centers assigned by MOA, which is located in ICAMA. There are 8 person and sets of instruments, including HPLC, GC, GC-MS, HPLC-MS, HPLC-MS/MS, MS/MS, SPE, GPC, ASE, AAS, etc. The Residue Center in ICAMA has established a project in 2004 to monitor pesticide residues in vegetables, fruits and tea of organic food; 5 823 samples were tested and the eligibility rate for residue was about 95 percent on average.

Generally speaking, MOA, MOH, GAQSIQ, and SAIC are all involved the management of food safety. For pesticides, MOA is in charge of the farm production, GAQSIQ, and SAIC are in charge of processed food. MOH is in charge of accidents.

D. Trends in pesticide manufacture, use and trade

China Pesticide Industry Association (CPIA) is the association, which is empowered by National Development and Reform Commission (NDARC) to issue the Production License. Another function is an information system between the factories and government. They have own publications and promulgate the information on pesticides every 10 days or more. The data of pesticides imported, exported and manufactured in 2004 are listed below:

Year 2004	**Tons active ingredient**	**Value Currency: USD**
Pesticide Imports	27 627 (TG and Formulation)	146.85 M (CIF)
Pesticide Exports	391 587 (TG and Formulation)	1 187.13 M (FOB)
Pesticide Manufacture	780 000 (a.i.)	
Insecticide Imports	6 823 (TG and Formulation)	37.51 M (CIF)
Insecticide Exports	209 624 (TG and Formulation)	447.25 M (FOB)
Fungicide Imports	10 321 (TG and Formulation)	55.91 M (CIF)
Fungicide Exports	57 755 (TG and Formulation)	215.14 M (FOB)
Herbicide Imports	9 625 (TG and Formulation)	49.30 M (CIF)
Herbicide Exports	175 430 (TG and Formulation)	475.51 M (FOB)
PGR Imports	188 (TG and Formulation)	1.90 M (CIF)
PGR Exports	7 686 (TG and Formulation)	30.75 M (FOB)
Rodenticide Imports	87 (TG and Formulation)	0.23 M (CIF)
Rodenticide Exports	1 030 (TG and Formulation)	3.32 M (FOB)
Other Pesticides Imports	13 (TG and Formulation)	0.06 M (CIF)
Other Pesticides Exports	10 621 (TG and Formulation)	11.41 M (FOB)

In all the pesticide produced in China, insecticides shares 48.9 percent, fungicides shares 10.5 percent and herbicide shares 26.4 percent.

Every batch of pesticides import or export should get a certificate, which issue by ICAMA, and show it to the Customs, the certificate shows the pesticide has been registration and could be sold in China. So ICAMA has the data for almost all the data on pesticides name, quantity, value and export or import.

In China, NDARC require enterprises to collect and record the data on manufacture and treading, NDARC and CPIA cooperate together.

There is a problem with illegal trade in pesticides. The registration of pesticide should spend a long time and cost lots of money so illegal trade in pesticides will never stop. On the other hand, since some chemicals are multi-functional, it is difficult to distinguish the use to the Customs. A few pesticides pass through Customs in the name of intermediate material or others. But it isn't a serious problem, with the communicating of ICAMA with the Customs, the quantity of illegal trade in pesticides is reducing step by step, and there is a small quantity of illegal trade by now.

E. Selected standards

MOA and NDARC control the high toxicity pesticides strictly in processing and using in China. According to the Regulations on Pesticide Administration, extremely and high toxicity pesticides are forbidden to use on vegetable, fruit, tea, Chinese medicine herbs, melon and public health. To reduce the acute poisoning, environmental contamination and crop residues, five OPs with high acute toxicity, i.e. methamidophos, parathion, parathion–methyl, phosphamidon and monocrotophos have been forbidden to be registered as mixture formulation and as single ingredient formulation; they could be registered only by TG plants and could be used on cotton, maize, rice and wheat only. By the end of 2006, there is no formulation registration and use on any crop in China. These compounds were produced and used plentiful. So, to replace the compounds in the market, the government invests more than 60 million US Dollars to research other compounds formulation (lower toxicity and more environmentally friendly) and agriculture method. In other hand, the investing will give the plants too which used to produce mentioned compounds to do the new products R&D and set up new equipments. Other banned ingredients are list as below:

Pesticides Banned to Produce and Use

Pesticides	Time of enforcement
Arsenic, Acetate, Mercury compounds, Dieldrin and Aldrin	Late 1960's to early 1970's
Fluoroacetamide	1982
BHC, DDT, Dibromochloropropane, Dikushuang	1983
Ethylene dibromide	1984
Cyhexatin	1986
Chlordimeform	Promulgated in 1990 and enforced in 1992
Iminoctadine (Befran)	1990
Tetramine, Silatrane	1991
Gliftor	1995
Nitrofen	Promulgated in 1997, production banned in 2000 and use enforced in 1992

The packaging of pesticides is prescribed by *General rules of Pesticide Packaging, Sampling Methods of Commercial Pesticides,* a. *General Rules of Pesticide Labels* is another national standard draft out by ICAMA. In the standards, government requires all the labels should indicate the toxicity classification and how to safely use and deposited. The pictographs, recommended by FAO are also recommend and could be used on the labels.

The ICAs and ICAMA do selective examinations of labels in the market every year. In general, the eligibility rate of label in the market is about 70 percent. ICAMA will issue an electronic label prospectus on the internet, which authorized by ICAMA, at the end of 2005 or early 2006, everybody can check them through internet, supervising the label in the market should be more easily and strictly.

There is no national training program/projects focusing on risk reduction yet. Some plants and local association are engaging this job occasionally.

Unfortunately, there is almost no practice or available services to collect and dispose of used containers and left-over pesticides also. Although the government recommends farmers to dispose the used containers safety, the dissemination is limited and it is difficult to carry out by farmers. In fact, farmers always throw used containers in the field or throw them away with other common rubbish; some even wash them and use them as a container again.

There are amounts of outdated or obsolete pesticides in the factories or with dealers. Some of them are manufactured again as the material, some of them piled up for many years. ICAMA and SEPA are planning and preparing a project to set up several facilities in the country, which should be used to deal with the used containers and outdated or obsolete pesticides in collaboration with GTZ.

According to the *Regulation on Pesticide Administration,* all the pesticides, including those used in the field and public health, domestic or import, must be registration in China. Every pesticide has one and only registration number. Almost all the pesticides in the market are registered by ICAMA. ICAMA publishes the registration information of pesticides in internet and periodicals. So it is easily to distinguish whether a pesticide has been registered and supervised in the market.

Licensing system for pesticide stores and transportation is prescribed by Guideline for Safety Store and Transportation on Hazardous Chemicals, which was issued by Ministry of Communications (MOC). But when it is put in practice, the licensing system is not successfully performing because of lack of monitors.

Conclusions and comments

There are five scopes of the Code that are particularly important for China and should be paid more attention to, as below:

- The first is quality management.
- The second is label management.
- Third is farmers education.

  Because most of products registration in China isn't new ingredient, new type of formulation, new crop, new pest or new application method, the toxicity is very similar with former products. In case of the hazardous impurities are eliminate in TG, the quality are eligible for the formulation, labeling is correct, and farmer use pesticides with the guide from label and specialist, it must be a satisfactory effect, residue is acceptable,

and safe to handlers, livestock, environment. The problems are some of poor quality or products with misguide-label sold in the market, and lack of monitor, the farmer have no ability to distinguish the quality, couldn't get the correct using method, and lacking of guidance from specialists.

- The fourth is market supervising.

  Although many staffers work for market supervising, it is still lack of human resource to the great market. Lacking of test equipment is another reason to restrict the market supervision.

- The last is pesticides disposal which has been mentioned.

  The IPM project should be seriously considered in the future.

China government has pursued the pesticides management for more than 40 years, and got many experience on it. There are 3 important strengths on pesticides management, as below:

- The first is MOA playing an important role for pesticides management. It is more able to harmonize the pesticides management than other departments; after all, most of population in China lives in rural areas.
- The second is a high level of *Data Requirement for Pesticides Registration* that has been published in recent years. The first edition of Requirement was published in 1982, it was drafted in reference to the requirement of U.S. Japan, Germany, Australia and FAO, and modified several time, it is now very fit for the development of Chinese pesticides industry and close to the requirements of developed countries.
- The third is the built-up of a system of pesticides management, from MOA to counties, with thousands of people engaged the project, and each level of department has its own responsibility.

There are two weaknesses in our management:

The first a lack of human resources. For example, there are more than 1 200 staff working for US EPA on the pesticide registration management, more than 80 staff work for the Registration Division, and other staff work for States to do the same work, but there only 90 staff (including administrative and financial, etc.) working for ICAMA, ICAs in provinces have no right to do the work of pesticide registration. On the other hand, there are too many factories and products in China, more than 2 600 plants are allowed to produce pesticides and about 2 500 new products got temporary registration certificates in 2005 to date.

The second weakness is farmer education. In general, the education level of farmers in China is poor and most farmers have only primary school education. As a result, it is difficult for them to have any knowledge about pesticides. They also lack channels to get the knowledge, almost half of knowledge on pesticides comes from other farmers. On the other hand, the government's provision of information and investment of pesticides to the farmers is limited.

All in all, I think the bottleneck of pesticides management is the general development level of China. So the most important affairs, which the government should do, are to keep the stabilization of society and developing the economy.

QUESTIONNAIRE SUMMARY

China

Selected Country Statistics:

Agricultural Population	**852 million**	**Agricultural Land:**	**154 million ha**
GDP $1 237 145 million	Agric. GDP: 15.4%	GNI per capita: $940	Hunger: 11%
FAOSTAT Pesticide Data	Export $729.5 million	Import: $134.0 million	Use:

GDP = Gross Domestic Product; GNI = Gross National Income; Hunger = Population below minimum energy requirement; FAOSTAT = latest data entry between 1998 and 2002

Institutional Profile

Ministry	**Legislation**	**Registration**	**Licensing**	**Enforcement**	**Testing**	**Training**	**Monitoring**	
							Environm.	**Health**
Agriculture		ICAMA	CAMTC		PPI, PPS	NATESC, PPS	ICAMA	ICAMA
Environment								
Health								
Other	NDRC			SAIC, AQSIQ	Inst., Univ.			

Industry Associations: CropLife China, China Pesticide Industry Assoc.
Non-Governmental Associations:

A. Pest and Pesticide Management	
IPM policy declared?	**Yes**
IPM mentioned in…	
Crop Protection Policy?	**?**
Agric. Sector Policy?	**?**
Other laws/documents?	**Yes**
National IPM Program?	**Yes**
Dept:	
IPM extension projects?	**Yes**
IPM research projects?	**Yes**
Pest resistance problems?	**Yes**

B. Testing, Quality Control and Effects	
Laws for pesticide specifications?	**Yes**
Low quality products in market?	**Yes**
Quality control laboratory?	**Yes**
Own analyses in 2004: **116**	
Outside analyses in 2004: ?	

C. Health and Environmental Information	
Data on pesticide poisoning cases?	**Yes**
occupational exposure cases: **2 044**	
accidental exposure cases: **?**	
intentional/suicide cases: **?**	
Pesticide poison facilities?	**Yes**
Number of facilities:	
Poison Information and Control Centers?	**Yes**
Number of centers: **1**	
Significant environmental contamination?	**Yes**
Data on effects on wildlife & ecosystems?	**?**
Pesticide residue monitoring system?	**Yes**
Number of analyses 2004: **5 823**	

D. Pesticide Manufacture, Use and Trade		
Pesticide Volume	*Tons*	*$'000 Value*
Imports	**27 627**	**146 850**
Manufacture		
Exports	**391 587**	**1 187 130**
Sales	**258 000**	**5 670 000**
Pesticide Use Profile	*Tons*	*$'000 Value*
Agriculture (total)	**258 000**	
Insecticides	53%	
Fungicides	10%	
Herbicides	25%	
Other	12%	
Veterinary		
Public Health		
Household		
Other		
TOTAL		

E. Selected Standards of Code of Conduct	
Illegal trade estimates?	**Yes**
Estimated amount 2004: ?	
Collection of old containers and pesticides?	--
Inventory of outdated/obsolete products?	--
Operational pesticide registration system?	**Yes**
Violations in 2004	
Existing facility licensing system?	**Yes**
Inspections in 2004	
Highly toxic products restricted?	**Yes**

Questionnaire responses: Yes = Yes; -- = No; ? = don't know; (blank) = no answer

DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA

by Rim Song Chol

Introduction

Pesticide Management is done under the coordinated planning and leadership of the government, from the principle of contributing to the protection of human health and ecological system and increasing agricultural production.

After adoption of the "International Code of Conduct on the Distribution and Use of Pesticides", the DPRK government has done the necessary work to discharge its duty in managing pesticides.

This report gives an outline of the past activities and present situation in the field of pesticides management in the DPRK.

National legislation and implementing agencies for the international code of conduct

– *National Legislation*

The main legislation for environment protection in the DPRK is "the DPRK Law on the Protection of Environment"(April 7, 1986).

It points out clearly the principles and activities needed to conserve, protect and improve the country's environment, and to minimize any negative effects that may cause to human health and economic development by destruction and pollution of environment.

It was amended twice after its adoption, and is in the renewed process in the light of the recent global efforts for protecting the ecological environment and in due reflection of the contents of some international conventions or protocols on environmental protection (e.g. Rotterdam Convention, Stockholm Convention and Montreal Protocol etc.).

This law includes some provisions of regulating the production, import and use of pesticides that damage human health and environment such as soil, air, forest, sea, freshwater and underground water, and these provisions are considered as basic provisions in national pesticide management.

The "Law on Land", "Law on Rivers", "Law on Agriculture", "Law on Pomiculture", "Law on Fish Breeding", "Law on Quality Control", "Law on Conservation of Biodiversity" and "Law on Public Health" also mention the provisions of regulating the use of dangerous pesticides and protecting the ecological environment and people who handle these pesticides.

The "DPRK Law on Pesticide Management", "Regulation on Pesticide Management" and other detailed regulations, all these are main legislations for pesticide management, which are now under consideration for further amendment.

The "DPRK Law on Pesticide Management" is the main legislation for managing pesticides, covering all questions arising in the production, supply, import, export, storage, use, registration and examination of the pesticides.

The draft version of this law presents clearly the principle issues needed for legal guarantee of effectiveness, efficiency and safety in the pesticide management.

The "Regulation on Pesticide Management" regulates the targets and applied means, working procedures and methods and other technical matters, needed for implementation of the "DPRK Law on Pesticide Management".

Detailed regulations were made for implementing the law and regulation on pesticide management such as the "Regulation on Registration and Examination of Pesticides", "Regulation on Safe Use of Pesticides", "Interim Regulation for Field Trial of Foreign Company's Pesticide Products in the DPRK" and so on.

The amendments of this law and other detailed regulations will go into force soon after getting an approval from the state.

As mentioned in the above, the legal basis was, in main, provided for the improvement of pesticide management in the DPRK. On this basis, the pesticide management work like production, import, export, distribution and use of pesticides is all developed in a more positive direction.

– *Implementation of the Code of Conduct*

The Ministry of Agriculture is exercising its unified control and guidance over the pesticide management in the DPRK, and the Agrochemicalization Research Institute under the Academy of Agricultural Science was authorized by the Cabinet to assume such functions as registering and examining the pesticides.

The institute prepares the drafts or amendments of the legislations on pesticide, and submits them to the Presidium of the Supreme People's Assembly and the Cabinet of the DPRK for the purpose of review, adoption and effectuation, under the agreement of the Ministry of Agriculture. It also registers the pesticides produced, imported and exported by the state, evaluates their quality and effectiveness and ensures the safety in use and performs the function of dissemination of technology and training work to help people know how to conduct storage and use of the pesticides.

The institute also prepares the national strategy on pesticide in close contacts with the Cabinet, the Ministry of Agriculture and other relevant agencies, and studies, introduces and develops new sciences and technologies for the production and use of pesticides.

The following agencies participate in implementing this Code of Conduct:

National Committee for FAO

It coordinates the implementation of the "International Code of Conduct on the Distribution and Use of Pesticides" in the country, and evaluates the possibility of the use of pesticide and takes measures to prohibit or restrict pesticides, according to the international requirement.

The Ministry of Agriculture

It requires for strict observance of the procedures and methods under the law and regulations in distribution, supply and use of the pesticides in agricultural production, and holds the control over such implementation.

The Central Sanitary Prevention Station under the Ministry of Public Health

It establishes and implements the measures to use pesticides for controlling sanitary insects and vectors.

The Research Institute of Sanitary Science under the Academy of Medical Sciences

It carries out the sanitary research and examination on influence of new pesticides to human and animals including acute and chronic toxicity and carcinogenicity, and takes proper measures for their safety.

The Bureau for Quality Control

It works out standards for pesticide products, inspects and controls by administrative means to confirm if the pesticide products produced, imported and traded in the country satisfy the registered standards.

It also inspects and controls if the residue of pesticide in food or agricultural products exceeds the permitted residue limit.

The Ministry of Foreign Trade and General Bureau of Customs

They control the import or export of pesticide products not registered or different with the standards, by legal or administrative means.

The Ministry of Chemical Industry

It manages the domestic production of pesticide products in general, is responsible for ensuring the quality, safety and efficacy of the products, and carries out the development of new products.

The Research Center of Environment Protection under the Ministry of Land and Environment Protection

It evaluates the influences of the production, storage and use of pesticides over environment as well as the suitability of pesticide use in environmental protection.

The Central Plant Quarantine Station

It observes the occurrence of pests in advance, determines the limits of economic damage and informs about the use of pesticides. At the same time, it conducts dissemination of pesticide technologies.

State Planning Commission

It regulates the production, import and supply of pesticides and gives the license for the pesticide service facilities.

All the agencies mentioned above exchange information through the pesticide registration and inspection agency, and discuss the pesticide-related issues at the National Pesticide Reviewing Committee before assessing and determining the status of relevant pesticides.

A. Management of pests and pesticides

A-1. The DPRK government has officially expressed its IPM policies in agricultural production from a long time ago.

The DPRK government draws up its consistent agricultural policy and shows its special attention to that strategy to ensure the safe and sustainable agricultural production whereby it, while decreasing the use of chemical pesticides, uses pesticides safe to eco-environment, applies all appropriate means of controlling pests such as agro-technical methods, biological method, bioengineering and physical methods and maintains the pest level below the one prior to economic loss.

The DPRK government saw to it that the institutes of agricultural science continue their studies for the implementation of the IPM, and the Ministry of Agriculture made its strategy to contain the study results in the Juche farming method.

The DPRK conducted a research work in 1980s to find the way of exterminating comprehensively the rice-harming pests by bio-pesticides and exterminating maize stem-borers by natural enemies at a regular period of July and August when the pests occurred severely in the paddy fields.

But it was not enough to successfully carry out the long-term comprehensive strategy of pest management aimed at putting a curve on growth of pests since it only resorted to one side of exterminating the pests. Since 1990's, the government put a task to the Ministry of Agriculture and Academy of Agricultural Sciences to play a leading role in realizing the IPM strategy.

A-2. The IPM priorities in the DPRK are to have comprehensive management on rice stem borer, rice water weevil, maize stem borer, armyworm, aphids occurring in cultivation of rice, maize and main leaf-vegetables like Chinese cabbage.

The FAO, in support of the DPRK's effort for IPM strategy, helped conduct two rounds of IPM training and imparting for the technical people working at the level of the center, province and county.

As a result, quite a few people of agricultural management acquired the knowledge and dissemination abilities of the IPM in the west coastal area. Based on this experience, we plan to train the experts and widen the dissemination work of technology for the people in the field.

The main research units are the Plant Protection Research Institute, Agrochemicalization Research Institute under the Academy of Agricultural Sciences and Plant Protection Laboratories under Provincial branches of Academy, and the administrative works are under the responsibility of the Ministry of Agriculture.

A-3. The DPRK government is accelerating the IPM development and encouraging the participation of farmers and related agencies into it.

First, operating the agriculture policies to encourage the development of bio-pesticides, natural enemies and micro-organic pesticides and to improve the cultivation technologies in a way where it uses a little chemical pesticides and fertilizers.

For this, the government is organizing on a new basis the specialized research institute and administrative structures and investing funds on these research works.

Second, scientific and technical dissemination is done through mass-communication like newspaper and TV.

Third, intensifying technical and financial cooperation with the international organizations including FAO, to introduce the advanced IPM technologies in consonance with the realities of the country.

A-4. The main constraints to IPM strategy are as follows;

- Lack of comprehensive knowledge on biological, cultivation technology and chemical extermination means used for IPM strategy;
- not to possess the knowledge on scientific and technical issues like the selection of control means and the integrated management manner based on establishment of quantitative thresholds for insects and natural enemies living in the crop cultivation environment;
- weakness of the material and technical foundation to realize IPM.

Therefore, we find there is a need to develop and accelerate IPM strategy, for this:

- to train the experts for IPM;
- to strengthen the relationship between the research institutes and the administrative organizations in the country, and to activate international interchange like the information exchange and the technical cooperation on IPM;
- to help the IPM implementing units prepare the material and technical foundation.

A-5. The resistance of pests to pesticides is raised as one of the important problems in realizing the sustainable agriculture in the DPRK.

The resistance of insects to the use of organophosphorus insecticides and deltamethrin for cereal crops like rice and maize, the resistance of potato blight to the use of metalaxyl and the resistance to the use of organophosphorus insecticides in controlling aphids, only bring about the results of increasing the kinds and dose of pesticides applied. Especially, the most serious problem raised at present is the damage by Plutella maculipennis and Pieris rapae with resistance to pesticides in the production of cabbage family vegetables that are used for making “kimchi”, a Korean traditional food.

So, the agricultural research institutes, recently, developed the integrated insect management method for sustainable vegetable production, and has applied it to 5 regions on a trial basis for some years.

The biological method to use benefit natural enemies inhibiting the insect population, the utilization of cultivation including crop rotation, selection of proper varieties and increasing fertility, the methods by managing practice of farms like readjustment of circumstance, and the methods of proper pesticide selection and dose decrease by establishment of thresholds of pests to decrease their population, have been applied in these legions, combining each other, and all experiences were integrated. On the basis of these results, the relevant protocols were prepared and the technologies are being disseminated gradually.

It is considered that accelerating the development and dissemination of IPM technology with intensified international technical cooperation and investment is important in solving the resistance problems, too.

B. Testing, quality control and effects in the field

B-1. All pesticides produced, imported, exported and marketed in the DPRK pass the quality control process.

With the recent rapid development of pesticide industry and the increase of sorts of pesticides around world, not a few difficulties were found in the quality control of pesticide, especially for imported ones.

The first is that the quality of some imported pesticides are different from the specifications on label or package of the products and the analysis for them is not carried out in time, so it leads to confusion in using the products.

The second is that some pesticides are not analyzed because of shortage of the means and methodology for analysis and the products enter into application without passing the quality control process. Some foreign companies put on sale their products thoughtlessly in disregard of the requirement of the Code of Conduct to furnish the analytical methods and standard materials of products.

To improve this status in pesticide management, the government strongly requires that pesticide products be imported only after registration and identification of them through the quality control process like analysis and examination for samples before importing, although they are products that have been recognized in the composition or effectiveness. The government is also establishing the working procedure to re-analyze and re-exam the products even if they have been distributed to users, in the case of being requested from the quality control agencies or users.

B-2. There is no legislation that requires pesticides to conform to relevant FAO or WHO specifications, at present. And discussion is now under way to include the related-provisions in the newly revised legislations.

B-3. There are laboratories for the pesticide quality control. But the capacities of local laboratories are not enough to undergo the full, timely and exact quality analysis for the pesticide products produced, imported, distributed and used in the DPRK. And few labs do not carry out the analysis for certain pesticides because of lack of necessary equipment and reagents.

B-4. All pesticides used in the DPRK are restricted by the permitted duration of safe use before harvest, when being applied. The permitted duration of safe use before harvest is in line with the international standard or is determined based on the residue analysis and permitted residue limits in the country, according to the specifications of the products. Especially, the demand for the permitted duration of safe use before harvest is much stricter, in case it is applied to vegetables or fruits.

The request on the quality control and effectiveness exam of pesticide products will be getting stronger, and therefore the problems related the quality of pesticide products in the level of last users could be decreased in DPR Korea.

C. Health and environment

C-1. All the policies in the DPRK are put into operation on the basis of principles to protect the lives and properties of the people and improve the people's health and living environment. To protect human health and environment from the pesticides, the government has mentioned the provisions to restrict the production, treatment and use of hazard chemicals like pesticides and to protect the people treating the substances, in the national laws including the "Law on Public Health" and the "Law on the Protection of Environment", and is implementing the legislations thoroughly.

C-2. The occupational poisoning cases have not yet been presented seriously among pesticide producers or users, up to now. Although there have not been the acute poisoning phenomena by pesticides, it is expected that the chronic poisoning among people who have handled pesticides for a long time, can be occurred, so precautionary measures for that are being taken in a timely manner. All hospitals and clinics in every rural areas of the country have the medical workers responsible for precaution and treatment of pesticide poisoning, and there are chemical poisoning treatment centers in hospitals of the big chemical factories including pesticide factories. Besides these rural clinics and poisoning centers, all hospitals have been prepared with technical capacities to treat especially the pesticide poisoning. The government, to prevent the poisoning cases in people treating pesticide, has clarified in legislation to supply exactly the necessary eutrophics and medication to workers using pesticides, and lets the relevant agencies perform the precautionary examination for them.

C-3. There is no national problem on environmental pollution presented by pesticide application. But, according to some investigation, it is evaluated that the population of aquatic organisms including fishes or frogs in paddy lands and streams is being decreased because of wrong use of pesticides and the surrounding soils of pesticide factories were polluted fairly. The issues on pollution of environment by toxic substances including pesticides and preventing it are under the responsibility of the Ministry of Land and Environment Protection, and the Research Center of Environment Protection carries out the investigation and research for them.

C-4. The pesticide residues in foods and agricultural products in the country are restricted up to permitted limits, and the limits coincide with the MRLs regulated by WHO. But the national application level of pesticides is relatively low compared with general world level, so almost no problems on pesticide residue in food and agricultural products are presented from the view of their resources. The pesticide residues in goods are under the restriction of legislation like "Law on Quality Control" and "Law on Agriculture" and the issue managing the safety of food from pesticide residue is under the responsibility of the Bureau for Quality Control.

D. Tendency in manufacture, use and trade of pesticides

D-1. The production of pesticides in the DPRK had amounted to several thousands tons as active ingredients. It was decreased because of some economic difficulties and, especially, by closed production process of pesticide which was required by international conventions or protocols on phasing out the hazard pesticides. More than half of the demand for pesticides is depended on the import in the DPRK.

The constitution of pesticides applied has changed, too. Nowadays, low dose of pesticides like sulfonyl urea herbicides and pyrethroid insecticides, and different natural substances and

microorganism pesticides developed in the country are being applied actively. Therefore, many toxic pesticides including organic mercury or organic chloride pesticides have been out of use in most cases or on a complete basis.

The government is paying big attention to establishing new pesticide industry in the country, as well encouraging the development of different natural substances and microorganism pesticides.

New pesticide industries are covering both the manufacture of active ingredients of pesticides and the processing industry of pesticide products.

D-2. The production, import, distribution and use of pesticides in the DPRK are performed under the control of the state, and the data for them are reported to the relevant governmental agencies on a regular basis.

D-3. As in other products, the government makes measures for control and supervision necessary to prevent the smuggling and illegal sale of pesticide products. There are no big problems for illegal trade of pesticides, at present.

The DPRK government will make its endeavor to ensure the safety and effectiveness of pesticide use more thoroughly, by intensifying greater national controls over the production, import, distribution and use of all pesticides.

E. Selected standards

E-1. The DPRK government encourages the participation of all relevant units and, especially, makes the pesticide industries fulfill their duties in ensuring all qualitive standards of products, namely, exact contents of active ingredients, evaluation of toxicity, packaging, labeling and effective application methods, to decrease the potential hazard of pesticides.

In relation to recent increase of pesticides applied, the government and pesticide industries are ensuring the effectiveness and safety of pesticide products, by examining the products through the agencies associated with the pesticide management including the National Pesticide Registration and Inspection Agency, preparing and disseminating the application protocols for safe use.

E-2. To keep the pace with the international effort to phase out toxic pesticides, the government is doing the activities to phase out some pesticides that have been produced or used. The pesticide products affecting negatively to human health and environment are being phased out, including the ozone deplete substances (ODSs) like MB and CTC which are used as agro-fumigants, and organic chloride pesticides which are used for controlling various pests. The phasing out of ODSs is at a final stage, and the plan to phase out POPs is in implementation stage. In case of receiving prohibition requirement for any pesticides or being presented with data on the toxicities or non-effectiveness from domestic research institute or users or from any international organizations, the government organizes the National Pesticide Reviewing Committee to review and decide it.

E-3. There is no national project focusing to the hazard reduction of pesticides at present. But the training related to it is being carried out continuously under responsibility of the Ministry of Agriculture. Especially, regions in the whole country organize the practical trainings on safety use of pesticides for agro-technicians once a year. When supplying the pesticide

products, the pesticide industries make it as a normal to provide the specially prepared protocols for safe application.

E-4. The collection system for the used container of general toxic materials including pesticides has been established in the country. All pesticide-supplying units can supply any pesticide products only after getting an assurance from purchasers that they will send back used containers and the purchasers can purchase other pesticide products from the suppliers after returning the used containers to them. The collected containers go into pesticide industries or are disposed by other safe means. There are some rare cases that the collection of containers is not performed completely, but no data is available that the no-collected containers go in for general use. There is no state system of collecting of residue pesticides in the country. In the present status of the country, there is no excessive supply of pesticide products. Accordingly, there can be found almost no pesticides left over. In the case of the left pesticide products, it is usual practice that they are labeled and stored by technicians to be used next time. But the left-over pesticides are requested to be analyzed before they are used next time.

E-5. There is some expectation that pesticides will be phased out in both pesticide industries and users in the country, but no data on significant stocks of them has been reported. The government is planning to include all pesticide items to be phased out in Annexes of Rotterdam Convention and Stockholm Convention, and to carry out overall survey on the production, import, supply, use and present stocks of them.

E-6. The Pesticide Registration System was established for the first time in the DPRK at the end of 1990's. After that, with the importance of pesticide management being emphasized, the "Law of the DPRK on Pesticide Management", "Regulation on Pesticide Management" and other detailed regulations were adopted and now the amendments of them are in consideration. All pesticides produced, imported, exported, supplied and applied in the country should be placed under the control of these legislations for pesticide management. On the basis of experiences and lessons accumulated through the operation of pesticide registration system in recent 5~6 years, the government is encouraging the voluntary participation of relevant agencies in all fields of pesticide management, and is intending to intensify the legal function and role.

E-7. There is a requirement for the pesticide products produced in domestic to take registration number, but not for imported pesticides, under present registration system. The issue on requirement of registration number for imported pesticides is reflected in the amendment of pesticide management regulation, so after approval of the amendment, all imported pesticides in the country shall be marketed only with getting the registration numbers.

E.8. There is a licensing system on storage of pesticide products. The pesticide products can be treated only by the licensed agencies in the country, and also the licensed material supplied agencies can store the pesticide products. When the cooperative farm or individual users storing not large amount of pesticide products, according to relevant regulations, they can store it in special pesticide stores or other establishment appropriate to pesticide storage, with labeling clearly, during restricted period.

Conclusion and comments

Some successes were achieved during the implementation of the Code of Conduct in the DPRK, and much experience has been accumulated in the field of pesticide management. Now, in order to increase the agricultural production and protect human health and eco-environment, the importance of pesticide management is emphasized. Now it is priority to strengthen the legal requirement and national control in this field.

- The present national pesticide registration system has an advantage of ensuring direct control over pesticide management work by the state through the pesticide registration and inspection agency and mobilizing voluntary and creative zeal of all agencies, organizations and people involved in the pesticide management.
- In the future, the national pesticide registration system will be intensified in the direction of ensuring safe and effective use of pesticides by increasing the scientific, technical and legal request in pesticide management including the requirement for registration number of pesticide products, the requirement for quality analysis of pesticide products and the requirement for examination of Effectiveness of pesticide products.
- The bottleneck in ensuring the safe management of pesticides is that the capacity to carry out the prompt and exact quality examination is not sufficient. The numbers of pesticide analysis laboratories are limited in the country and the labs are not equipped sufficiently with necessary equipment and instruments, it means that they can't satisfy the demands for quality control of the pesticide products produced, imported and distributed and for product analysis from users, timely or qualitatively. So, we count on the active cooperation from the International Organizations including FAO in our efforts to reinforce the capacities of pesticide quality control laboratories.
- In future, the priority will be given in pesticide management to evaluating the effect and quality of pesticides while evaluating the effect for human and environment, since we had already established the national legal basis for pesticide management.

To improve the pesticide management and reduce the hazardous effects by pesticide use is not merely for an individual country or region or an industry only, but it is an international work to prevent from the world environment pollution and promote the welfare of mankind. Especially, the developed countries should enhance their responsible roles in this field, as they became main suppliers in world pesticide markets. The DPRK government recognized the necessity of international cooperation in improving the national pesticide management and in intensifying its material and technical foundation, and hopes that the cooperation and collaboration will be more activated in this field in the future.

The DPRK government will make all possible efforts, in future, too, to fulfill its responsibility in implementing the international legislations like "International Code of Conduct on the Distribution and Use of Pesticides" in order to protect human health and eco-environment and ensure the sustainable development of agricultural production.

QUESTIONNAIRE SUMMARY

Democratic People's Republic of Korea

Selected Country Statistics:

Agricultural Population	**6.4 million**	**Agricultural Land**	**2.7 million ha**
GDP	Agric. GDP:	GNI per capita:	Hunger: 3%
FAOSTAT Pesticide Data	Export	Import:	Use:

GDP= Gross Domestic Product; GNI = Gross National Income; Hunger = Population below minimum energy requirement; FAOSTAT = latest data entry between 1998 and 2002

Institutional Profile

Ministry	**Legislation**	**Registration**	**Licensing**	**Enforcement**	**Testing**	**Training**	**Monitoring**	
							Environm.	**Health**
Agriculture		AAS		MoA, AAS	AAS	AAS		
Environment								
Health								
Other			Planning	B Qual. C.				

Industry Associations:
Non-Governmental Associations:

A. Pest and Pesticide Management	
IPM policy declared?	**Yes**
IPM mentioned in…	
Crop Protection Policy?	**Yes**
Agric. Sector Policy?	**Yes**
Other laws/documents?	**Yes**
National IPM Program?	**Yes**
Dept:	
IPM extension projects?	**Yes**
IPM research projects?	**Yes**
Pest resistance problems?	**Yes**

B. Testing, Quality Control and Effects	
Laws for pesticide specifications?	**Yes**
Low quality products in market?	**Yes**
Quality control laboratory?	**Yes**
Own analyses in 2004:	
Outside analyses in 2004:	

C. Health and Environmental Information	
Data on pesticide poisoning cases?	--
occupational exposure cases:	
accidental exposure cases:	
intentional/suicide cases:	
Pesticide poison facilities?	**Yes**
Number of facilities:	
Poison Information and Control Centers?	**?**
Number of centers:	
Significant environmental contamination?	**?**
Data on effects on wildlife & ecosystems?	--
Pesticide residue monitoring system?	**Yes**
Number of analyses 2004:	

D. Pesticide Manufacture, Use and Trade		
Pesticide Volume	*Tons*	*$'000 Value*
Imports		
Manufacture		
Exports		
Sales		
Pesticide Use Profile	*Tons*	*$'000 Value*
Agriculture (total)		
Insecticides		
Fungicides		
Herbicides		
Other		
Veterinary		
Public Health		
Household		
Other		
TOTAL		

E. Selected Standards of Code of Conduct	
Illegal trade estimates?	**?**
Estimated amount 2004	
Collection of old containers and pesticides?	**Yes**
Inventory of outdated/obsolete products?	**?**
Operational pesticide registration system?	**Yes**
Violations in 2004:	
Existing facility licensing system?	**Yes**
Inspections in 2004:	
Highly toxic products restricted?	**Yes**

Questionnaire responses: Yes = Yes; -- = No; ? = don't know; (blank) = no answer

INDIA

by Ms Mukul Singh, Dr

Introduction

The institutions in India that play a role in the implementation of the Code of Conduct are as below:

Government of India
Ministry of Agriculture
Department of Agriculture and Cooperation
Krishi Bhawan, New Delhi

Secretariat of Central Insecticides Board & Registration Committee
Government of India
Ministry of Agriculture
Department of Agriculture & Cooperation
Directorate of Plant Protection, Quarantine & Storage
NH IV, Faridabad-121 001, Haryana

States Departments of Agriculture

Indian Agriculture and Research Institute
Krishi Anusandhan Bhavan
New Delhi

Indian Council of Agriculture and Research
Krishi Anusandhan Bhavan
New Delhi

Ministry of Environment and Forest
Government of India

The Insecticides Act, 1968, which came into force in 1971, regulates import, manufacture, sale, transport, distribution and use of *insecticides* (including herbicides, fungicides, rodenticides, etc.) for the sake of prevention of risk to human beings and animals. Ministry of Agriculture (Government of India), being the user Ministry administers this Act. Secretary of the Central Insecticides Board and Registration Committee, Directorate of Plant Protection, Quarantine and Storage, Ministry of Agriculture are the authorities concerned on requirements for consideration of grant of registration and other related matters.

Central Insecticides Board (CIB) and the Registration Committee (RC) are two “high-powered” bodies under this Act. CIB is the Apex Advisory Body, which advises the Central and the State Governments on technical matters arising out of administration of this Act. It comprises eminent scientists of all disciplines/fields concerned. Whereas, the RC grants registrations to the persons, desiring to import or manufacture insecticides, after scrutinizing their formulae and verifying claims with respect to their bio-efficacy and safety to human beings and animals. A Secretary, who is also the Secretary to CIB, and expert scientists from the field of Chemistry, Entomology, Plant Pathology, Weed Science, Medical Toxicology and Packaging Engineering support the functioning of the CIB &

RC. Obtaining registrations for manufacturing/importing insecticides is mandatory under the law. Though the members of the RC are also the members of the CIB yet as far as decision-making is concerned, the two are independent of each other. However, consultation with the CIB is essentially required by the Central or State Governments in making the Rules under this Act to facilitate its implementation.

The Insecticides Act, 1968 had been last amended in the year 2000 to make penal provisions of the act more stringent to discourage and deter regular offenders.

Status of the regulatory measures in pesticide management, list of regulation and legislation

NATIONAL LEGISLATION

No.	Legislation	Administered by
1	Insecticide Act, 1968 and the Insecticides Rules, 1971	Ministry of Agriculture Department of Agriculture & Cooperation
2	Environment Protection Act, 1986	Ministry of Environment & Forest
3	Prevention of Food Adulteration Act, 1954	Ministry of Health & Family Welfare

A. Pest and pesticide management

Keeping in view the global concern about harmful impact of pesticides on the environment, the Govt. of India recognized the benefits of Integrated Pest Management (IPM) programme during 1985 and adopted IPM as the cardinal principle and main plank of plant protection strategy in the overall crop production programme. The objectives of IPM approach are to maximize crop production with minimum input cost, minimize environmental pollution and maintain ecological equilibrium. Pest surveillance/monitoring are the main activities of Central Integrated Pest Management Centres (CIPMCs).

The notable initiatives taken by the Govt. of India for the promotion of IPM on sustainable basis are:

1. Establishment of central IPM centers

There is adequate network of extension functionaries in the State Departments of Agriculture who are always available to educate and help the farmers. Department of Agriculture & Cooperation has also established 26 Central Integrated Pest Management Centres (CIPMCs) in most of the States/ UTs to educate farmers and impart on-field practical training to them. The National Plant Protection Training Institute (NPPTI) at Hyderabad imparts training to the State Plant Protection functionaries.

2. Organization of the Farmers Field Schools

Farmers Field Schools are regularly organised under the IPM programme in addition to Season Long Training for Masters Trainers' under which State Extension Functionaries are trained for full cropping period of various crops. State Agricultural Universities, Krishi Vigyan Kendras and State Department of Agriculture also organise training to the farmers on safe use of pesticides.

A large number of bio-pesticides based on fungi, viruses and bacteria, pesticides based on plant origin viz. neem, pyrethrum, cymbopogon have been registered which are safe to human beings, animals and the environment.

Infrastructural Development

- Setting up of 26 Central IPM Centers (CIPMCs) for promotion of IPM approach in 22 States and 1 Union Territory.
- Financial assistance to States for setting up of 29 State Biocontrol Laboratories and emphasis on production and releases of biocontrol agents.

Human Resource Development

- Organizing season-long training programme for the training of trainers.
- Setting up of Farmer's Field Schools (FFSs) in farmers' fields to train Agricultural Extension Officers and farmers.
- Demonstration of field tested IPM practices.

Policy Support

- Increase in the financial outlay for promotion of IPM
- Phasing out subsidy on pesticides and diverting the resultant savings for promotion of IPM programme.
- Phasing out/banning/restricting the use of hazardous pesticides.
- Liberalized criteria and procedure for registration of biopesticides and pesticides of plant origin.
- Emphasis on production and use of biocontrol agents, biopesticides and pheromones.

Research support

A national centre for IPM has been established by Indian Council of Agricultural Research (ICAR) to compliment and supplement research inputs on IPM.

Development of IPM Packages of Practices

With a view of wide publicity and adaptation of IPM practice at the grass root level, Government of India, Ministry of Agriculture, Department of Agriculture & Cooperation, Directorate of Plant Protection, Quarantine and Storage get technical inputs from ICAR and the state Agricultural Universities, State Departments of Agriculture and Horticulture have developed 77 IPM packages of practice for major crops for the use of farmers and extension functionaries.

Pest Surveillance and monitoring

It is conducted by CIPMC to keep a close and regular watch over the development of pest, their natural enemies with reference to the prevailing weather factors in the crop ecosystem and helps in forewarning the likely pest build up to facilitate planning and adaptation of suitable IPM strategy.

Contraints in the way of IPM

IPM is the most environment-friendly approach of crop-protection and prescribes use of chemical pesticides as the last resort. However, most of the large farming community in India is not much educated. IPM takes time to show results whereas human beings, by their very nature, are

accustomed to see results right under their eyes. Therefore, they are averse to adopt the programme. Moreover, most of the bio-control agents are location/climate specific whereas temperature changes in different areas in India are drastic most of the time. It leads to failure of bio-control agents at several places. Therefore, education and right kind of bio-pesticides, which can survive a wide range of climate variations, are essential for this programme to succeed.

1. Though the IPM technology in rice, sugarcane and cotton pests is fully available but the same in other crops are yet to be developed.
2. Selective pesticides, effective against crop pests, but safer against natural enemies are still not very much available.
3. One of the basic point of IPM is ETL, which has not been worked out for all the pests and combination of pests for different varieties and regions. Also the potential of biocontrol agents has not been considered in ETL developed so far.
4. Techniques of mass rearing of several bioagents are still not well developed.
5. The Indian farmers, by and large not well educated and have different socio-economic environment which is also a constraint in introducing a new technology.
6. A few IPM demonstrations here and there in the country may not make much impact in accepting this technology by the farming community of the country. There is an urgent need for extension and development efforts on large scale for transfer of IPM technology at field level. This certainly requires a strong infrastructure and facilities.
7. Most of the chemical pesticide manufacturers/firms/dealers are not coming forward in strength in creating awareness among general masses about hazardous effects of chemical pesticides and are still advocating the advantages of their product just to sell them in the market for their own profits.
8. A joint survey team comprising officials from both Agriculture and Horticulture University, Dept. of Agriculture & Horticulture and Centre Government be made to monitor the build up of various pests and their defenders at regular intervals and accordingly control measures should be applied.
9. Department of Agriculture and Horticulture, should not fix the targets for selling the pesticides by their officials at sales point.
10. IPM training programmes and FFS in farmer's field be carried out on large scale throughout the country to create awareness among farming community regarding adverse effects of indiscriminate use of pesticides and usefulness of IPM practices.
11. One should not be depend wholly on laborers for carrying out pesticide spray. Technically qualified person should supervise the pesticide spray programme.
12. Many spurious pesticides have hit the market on large scale. Some pesticide manufacturers use the containers of big and popular brands to sell their products. So, an effective check should be there and defaulters should be punished.
13. Centre Government as well as State Governments must try to highlight the adverse effects of chemical pesticides and usefulness of IPM through AIR and Doordarshan more frequently to create awareness among the masses in general and farmers in particular.
14. Govt. should enact rules under which every farmer going for pesticidal spray beyond specific limit must obtain prior permission from Department of Agriculture and Horticulture and the defaulters should be punished for polluting the environment.

15. Participation of NGO's, women organization, Panchayti Raj Institutions be encouraged to have greater physical impact of IPM programme at grass root level.
16. Production of biocontrol agents and biopesticides should be given special attention through mass rearing in laboratory and their subsequent releases.
17. Farmers should be given subsidy only on biopesticides, bioagents, biofertilizers and neem based pesticides in order to reduce load of chemical pesticides.
18. There is an IPM authority at National and State level which should be made responsible for execution of IPM programme at National and State level on sustainable basis.
19. Periodical reviews of all IPM programmes being carried out by Centre/State/Private agencies be made by IPM authority constituted for the purpose.
20. Under implementation strategy, partnership with ICAR, SAUs, Govt. agencies, NGOs and International partnership is essentially required.
21. Some system may be developed for production, inspection and quality insurance of biopesticides/bioagents/biofertilizers/pesticides of plant origin e.g. neem.
22. There must be an advanced research centre on organic farming in various states of the country where the potentials of biopesticides/bioagents/biofertilizers could be fully explored.
23. There is urgent need to start graduate/post graduate courses on organic farming in SAUs/ICAR Institutes/deemed universities.
24. Govt. shoud provide structural and infrastructural support for establishment of organic markets and bio-villages in different states. The produce should be certified by a competent recognized authority.

IPM future thrust

- Constitution of more intensive field based trainings and demonstrations for Human Resource Development on IPM.
- Establishment and strengthening of more biocontrol laboratories in the States for augmenting the biocontrol potential.
- Conservation of the naturally occurring biocontrol agents by discouraging the use of broad spectrum and hazardous chemical pesticides.
- Sustained publicity through electronic; and print media for creating greater awareness among the public/farmers.
- Encouragement to NGOs and women organizations for their greater participation in the promotion of IPM.
- Perspective National Plan for IPM is being prepared.
- Computer networking of all Biocontrol Units present in the country with Directorate of Plant Protection, Quarantine & Storage/DAC, Krishi Bhavan, New Delhi is required.
- Expert team report on use of remote sensing technology in Plant Protection has been received. Initially, the expert team has recommended taking up the studies in Rajasthan/ Haryana/Punjab/Andhra Pradesh and Tamil Nadu.
- Working group has been constituted to recommend the pest monitoring strategy in future.

B. Testing, quality control and effects in the field

Wherever there are sheep, there are black sheep too. India is a vast country. Instances of availability of spurious pesticides in some parts of the country do come to notice. India has a standard framing agency, called Bureau of Indian Standards (**BIS**). The method of analysis of an insecticide is submitted by an applicant at the time of its registration is verified and then adopted after a cumbersome process to ensure its practicality by a large group of scientists from the field. Samples failing to meet quality standards are referred to as "misbranded" pesticides. Importing, manufacturing, distributing, selling misbranded or banned pesticides or causing to use unapproved pesticide is a punishable offence under the provisions of the Insecticides Act, 1968 and the rules framed thereunder. These standards are followed in monitoring the quality of a product. In case of international business, if required, FAO/WHO specifications are followed too as per the agreement between the seller and the purchaser. India is a signatory to FAO *Code of Conduct on the Distribution and Use of Pesticides* and in implementing its provisions. The Insecticide Act, 1968 and the rules framed thereunder take care of by and large all the provisions of the Code of Conduct except for the advertisement.

For the enforcement of the quality of pesticides, four important functionaries are notified under the provisions of the Insecticide Act/Rules viz., Licensing Officers, Appellate Authority, Insecticide Inspectors and Insecticide Analysts.

A network of 46 Pesticides Testing Laboratories, situated in 18 States and 1 Union Territory across the length and breadth of the country, with an annual analysis capacity of over 55 666 samples of pesticides is available in the country for continuously monitoring the quality of pesticides. One of the notified functionaries of the Government, Insecticide Inspectors can enter and search, at all reasonable times and with such assistance as he considers necessary in which he has the reason to believe that an offence under the Insecticides Act, 1968 and the Rules made there under has been or is being or is about to be committed, or for the purpose of satisfying himself that the provisions of this Act or the Rules made there under or the conditions of any certificate of registration or license issued there under are being complied with. Insecticide Inspectors also draw samples of pesticides, Insecticide Analysts, carry out their analysis. Besides, the Central Government has also established two Regional Pesticides Testing Laboratories to supplement the resources of the States/UTs, who do not either have a Pesticide Testing Laboratory or adequate analysis capacity or adequate analysis facility for monitoring the quality of pesticides. Any disputes in the results of analysis are settled by a referral laboratory of the Central Government, called the Central Insecticides Laboratory (**CIL**). In order to strengthen the existing laboratories and to set up new Pesticides Testing Laboratories, the Central Government also extends financial assistance to the States/UTs as grants-in-aid. Besides, State Governments also establish additional Pesticides Testing Laboratories with their own resources.

The Central and State Governments also hold meetings with the associations of pesticide industry to know their genuine difficulties/problems and find appropriate solutions by mutual interaction. Pesticide Industry also helps in Human Resource Development by adopting villages and imparting training to farmers. Some of the members of the industry have made efforts to keep fields pesticide free by using only bio-control methods of pest control. Farmers are trained in observing waiting periods, which are arrived at after continuous monitoring of pesticide residues. They are also trained on biological magnification of pesticides so that they do not compromise on observing waiting periods.

C. Health and environmental information

The Insecticide Act, 1968 and the rules framed thereunder regulates the import, manufacture, sale, transport, distribution and use of pesticides with a view to prevent risk to the human beings and animals and the matter related therewith. The Committee registers the pesticide only after satisfying itself regarding the efficacy of the pesticide and its safety to human health and animals. The Insecticide Rules takes care of the safety culture in pesticide handling and use. It covers protective clothing, respiratory devices, symptoms of poisoning, safety precautions antidotes and first aid medicines, training of workers and disposal of used packages, surplus materials and washing of insecticides.

India has four poison information centers including the National Information Centre at All India Institute of Medical Science in New Delhi. The Poison Information Centre is a specialized unit providing information on prevention, treatment of poisoning and hazard management. The information on poisoning due to pesticide is regularly collected and discussed in the national conferences however there are some constraints due to unavailability of the complete report due to unavailability of the complete report due to unavailability of the complete report.

While registration of pesticide under the Insecticide Act 1968 for use in the county, it is ensured that no residue of pesticide is left at the time of harvest of the crop. The maximum Residual limits (MRL) are fixed by Ministry of Health & Family Welfare (MOH&F) under the PFA Act 1954 on the basis of the residue and the Toxicological Information provided by the Ministry of Agriculture and thus the monitoring of the pesticide residues fall under the preview of the MOH&F. However, Directorate of Agriculture & Co-operation has been allocated the pesticide monitoring recently. A central Scheme “monitoring of pesticide residues” have been formulated/approved with an outlay of Rs. 24 crores with an objective to ascertain the prevalence of pesticide residues at farm-gate and marked yards so that remedial measures could be undertaken through IPM campaign to eliminate the risk of pesticide residues from agricultural commodities with special emphasis on export products.

D. Trends in pesticide manufacture, use and trade

The information is being regularly obtained from the different States and the Union Territory and is periodically reviewed by DAC with the States during zonal/national conferences on agriculture for Kharif/Rabi campaigns. The details are in the Questionaire annexed. At present there is no provision to regularly obtain the information from the pesticide industries. There are some gaps in the available information. Some cases of illegal trade of pesticides have come to notice.

E. Selected standards

Under the Insecticide Act, compulsory registration of pesticides is provided. The manufacture, import, export and use of chemicals pesticides can be initiated only after the proper registration by the Registration Committee, after close scrutiny of the data about bio-efficacy and safety of human beings, wildlife, birds, domestic animals, beneficial parasites and predators.

The Insecticide Rules takes care of the safety culture in pesticide handling and use. It covers periodical clothing, respiratory devices, antidotes and first aid medicines, training of workers and disposal of used packages, surplus materials and washing of insecticides. Besides, training is imparted to the doctors of Health Centres of States by the medical experts of the Directorate of Plant Protection, Quarantine & Storage.

The Registration Committee reviews the pesticide from time to time and the recommendations are considered by the Ministry of Agriculture. The committee as the policy has decided not to register WHO class IA and IB pesticide unless there is sufficient justification.

The Directorate of Plant Protection & Quarantine has good schemes for training at the State level. The National Plant Protection Training Institute (NPPTI) at Hyderabad imparts training to the State Plant Protection functionaries. Farmers Field Schools are regularly organized under the IPM programme in addition to season-long training for Masters Trainers under which State Extension Functionaries are trained for full cropping periods of various crops. State Agricultural Universities, Krishi Vigyan Kendras and State Department of Agriculture also organize training to farmers on safe use of pesticides.

Pesticide disposal

The common practice is to collect obsolete pesticides and used containers and dispose of them by effective incineration or burying deep in strong caustic environment in desert. Some stock of obsolete pesticides is present in the country.

National Legislation and Enforcement

PESTICIDE CONTROL LEGISLATION

No.	Legislation
1	Insecticide Act, 1968 and the rules framed under it Insecticide Rules, 1971
2	Environment Protection Act, 1986
3	Prevention of food Adulteration Act, 1954
4	Factories Act, 1948

Under the Act, compulsory registration of pesticides is provided. The registration certificate has the number. After the grant of registration, a prospective manufacturer is required to obtain a license to manufacture a particular pesticide from the State government where the manufacturing unit is located. Manufacturing License is granted after proper inspection and ensuring availability of essential infrastructure for the purpose. Besides, State Governments concerned issue licenses for distribution or sale of insecticides without necessitating a registration. Plant Protection Adviser to the Government of India issues licenses for commercial pest control after ensuring technical competence of the operator.

Conclusions and comments

Area of Code that are particularly important in India

Article 3.11 of Pesticide Management with reference to 3.11 promoting resistance management strategies is especially important for our country.

Problems relating to pesticides that need attention

Strengthening of the risk assessment

While registration of pesticide under the Insecticide Act 1968 for use in the county, it is ensured that no residue of pesticide is left at the time of harvest of the crop. However a better system of risk assessment is required for the country.

Strengthening of IPM

IPM is the most environment-friendly approach of crop-protection and prescribes use of chemical pesticides as the last resort. However, most of the large farming community in India is not much educated. IPM takes time to show results whereas human beings, by their very nature, are accustomed to see results right under their eyes. Therefore, they are averse to adopt the programme. Moreover, most of the bio-control agents are location/climate specific whereas temperature changes in different areas in India are drastic most of the time. It leads to failure of bio-control agents at several places. There is need to develop IPM technologies for more crops and ETL for many more pest and the combination of the pests. Techniques of mass rearing of several bioagents are still to be developed.

Therefore, education and right kind of bio-pesticides, which can survive a wide range of climate variations, are essential for this programme to succeed.

Quality control laboratories

Though India has a network of 46 quality control laboratories with a capacity of analyzing about 56 616 samples per year but there is a need to increase their capacity/develop more fully equipped centers for the purpose of better monitoring of the quality of the pesticides.

Inventory of the obsolete pesticides and safe disposal of the pesticide

There is a need to develop an inventory to have the information about the obsolete pesticide and better means for their disposal.

Strengths and weaknesses of the present pesticide management system

The Insecticide Act and the rules framed under is the greatest strength. Since India is a vast country the implementation of the various provisions of the Act for effective pesticides management and to control spurious and misbranded pesticides is a challenging task.

Major bottlenecks to ensure sound pesticide management

The import of the pesticide in disguise of other chemicals. Under such situations it become very difficult to manage the pesticide.

Enforcement of the pesticide management

Since India is a vast country the implementation of the various provisions of the act for effective pesticides management and to control spurious and misbranded pesticides is a challenging task. due to shortage of enforcement staff.

Priority areas for strengthening pesticide management

- Enforcement of the pesticide management
- Inventory of the obsolete pesticides and safe disposal of the pesticide
- Strengthening of the risk assessment
- Strengthening of IPM

QUESTIONAIRE SUMMARY

India

Selected Country Statistics:

Agricultural Population	**553 million**	**Agricultural Land**	**170 million ha**
GDP $598 966 million	Agric. GDP: 22.7%	GNI per capita: $530	Hunger: 21%
FAOSTAT Pesticide Data	Export $374.9 million	Import: $107.6 million	Use: 91 487 ton

GDP = Gross Domestic Product; GNI = Gross National Income; Hunger = Population below minimum energy requirement; FAOSTAT = latest data entry between 1998 and 2002

Institutional Profile

Ministry	**Legislation**	**Registration**	**Licensing**	**Enforcement**	**Testing**	**Training**	**Monitoring**	
							Environm.	**Health**
Agriculture		PPQS	States	States	ICAR, IARI, PLT	NPPTI		
Environment								
Health					ICMR			
Other								

Industry Associations: CropLife India, Indian Pest Control Assoc., Crop Care Fed. of India, Pestic. Manuf. & Formul. Assoc. of India

Non-Governmental Associations: Centre for Science and Environment (CSE), Voluntary Health Assoc. of India

A. Pest and Pesticide Management	
IPM policy declared?	**Yes**
IPM mentioned in…	
Crop Protection Policy?	**Yes**
Agric. Sector Policy?	**Yes**
Other laws/documents?	**Yes**
National IPM Program?	**Yes**
Dept: **PPQS**	
IPM extension projects?	**Yes**
IPM research projects?	**Yes**
Pest resistance problems?	**Yes**

B. Testing, Quality Control and Effects	
Laws for pesticide specifications?	**Yes**
Low quality products in market?	
Quality control laboratory?	**Yes**
Own analyses in 2004: **42 900**	
Outside analyses in 2004:	

C. Health and Environmental Information	
Data on pesticide poisoning cases?	**Yes**
Total cases (2003/04): **4 789**	
occupational exposure cases: **?**	
accidental exposure cases: **?**	
intentional/suicide cases: **?**	**Yes**
Pesticide poison facilities?	
Number of facilities: **5**	**Yes**
Poison Information and Control Centers?	
Number of centers: **1**	--
Significant environmental contamination?	--
Data on effects on wildlife & ecosystems?	**Yes**
Pesticide residue monitoring system?	
Number of analyses 2004:	

D. Pesticide Manufacture, Use and Trade		
Pesticide Volume	*Tons*	*$'000 Value*
Imports	**11 050**	**89 796**
Manufacture		
Exports	**69 052**	**396 360**
Sales		
Pesticide Use Profile	*Tons*	*$'000 Value*
Agriculture (total)	**41 020**	
Insecticides	65%	
Fungicides	19%	
Herbicides	15%	
Other	1%	
Veterinary		
Public Health		
Household		
Other		
TOTAL		

E. Selected Standards of Code of Conduct	
Illegal trade estimates?	--
Estimated amount 2004	
Collection of old containers and pesticides?	--
Inventory of outdated/obsolete products?	--
Operational pesticide registration system?	**Yes**
Violations in 2004	
Existing facility licensing system?	**Yes**
Inspections in 2004	
Highly toxic products restricted?	--

Questionnaire responses: Yes = Yes; -- = No; ? = don't know; (blank) = no answer

INDONESIA

by Joeli Hartono Rianto

THE DEVELOPMENT OF PESTICIDES MANAGEMENT POLICY IN INDONESIA

Background and justification

Most developing countries as it is in Indonesia, pesticides have been using for more than four decades. Pesticides application has become one of the most important means in dealing with pest and disease control of either crops or any other fields such as household, quarantine, fishery, wood preservative, pre-shipment, stored products and so on. There are many more activities in the communities where pesticides are being applied for their own purposes.

When the use of pesticides was introduced at the first time, it was mostly intended to control pest on important crops like paddy and secondary crops. Unfortunately, no one was aware how its use would induce negative impacts to the environment as its use grew substantially. In addition, most farmers have not been well trained yet to handle pesticides properly, and consequently occupational death, environmental damage and severe injuries were hence, unavoidable.

No sufficient regulation existed as the use of pesticides began in the early sixties and there were no technical instruments as well as technical adviser available. Farmers learned how to use these products from their neighborhood and to some extent they asked field worker to make sure of the choice.

As most pesticides in Indonesia were applied for agricultural practices, the government of the Republic of Indonesia assigned the Minister of Agriculture to manage pesticides through the Government Stipulation No. 7 of 1973. Any pesticides intended for use and distribution in Indonesia should hold permission issued by the Minister of Agriculture or otherwise it is considered as illegal use and distribution.

Based on the above government stipulation, Minister of Agriculture then, has issued a number of decrees dealing with procedure on registration, requirement on label and packaging, limitation on registration, terminating of registration and so on. Those split policy was issued within different periods of time as it brings inconsistency when going through implementation. Hence, the government has to provide one comprehensive regulation at once to be the only powerful rule in serving people at better standard.

It was started in 2001 when the Minister of Agriculture issued the Ministry of Agricultural Decree No. 434.1 as so called De-regulation on pesticides registration. It was a spectacular decree as all previous decree of different aspects were compressed into one single package of regulation containing most recent technical requirement that are more or less international standard. Besides, such regulation opened more opportunity to any new player in pesticides business as far as all technical as well as administrative requirements are fulfilled. All registration documents should comply with standard data as issued by FAO/WHO or any other recognized institute specification. In addition, validity data have become imperative for evaluation. It means, not all data and information are accepted unless they are considered valid and be worthy of further evaluation.

To get along with the harmonization program on the pesticides registration, the government of Republic of Indonesia has kept trying to adopt standards (when applicable) issued by dedicated

international institution such as FAO/WHO, US-EPA, OECD etc. Nowadays, any pesticide product that is registered in the country bears international standard as it was evaluated quite strictly when it applied for registration.

Pesticides application in Indonesia

From the perspective of crop management, the use of pesticides will be only the last alternative as the concept of IPM has been socialized as well as implemented to most Indonesian farmers, including those working on estate crops. Field schools were established at considerable number of the production center throughout the country. The implementation of IPM concept was successfully done except for those who are cultivating crops in the remote areas. There were hundreds thousands of farmers trained on IPM concept and farmer's understanding on such a concept was quite high.

Due to such a consideration, de-regulation on pesticides registration was issued on the base of IPM approach. Meanwhile, government has offered industry to apply for new registration for their products as it may create more products available in the market, hence it brings about more competition, empowering bargaining position of farmers, availability of good but affordable products, guarantee availability and so on. However, all marketed pesticide products are subject to review as they indicate negative evidence that harm people or environment when it is applied not complying with IPM concept.

Even more items are now available in the market, but in fact not all of them are really absorbed. It is going to be back on the market mechanism where the best and most competitive product can remain in the market to help farmers. Many of them seem not too attractive to use.

Pesticides may help increase the quality of agricultural products in many ways as its use quite large in quantity. Some pesticides have to be applied on the basis of interval application in case of preventing crop from suffering from a number of major diseases. Most horticultural products are considered as high-economic commodity that needs to be more protected from pest and diseases rather than any other agricultural commodity.

Meanwhile, pest and diseases problems on crops occur all the time at any time since crop are always there. Planting season all the year round obviously provide sufficient food for pest. This situation help promote threatening any cultivated crop from loss due to pests. Therefore, pesticides application may not be held from use what so ever.

Progress of registered product

Pesticides intended to register varies from household pesticides to Plant Growth Regulator (PGR). Among them, herbicide is the highest in number on registration following by insecticide, fungicide, rodenticide etc. Based on our statistical data by end of 2004 the total numbers of registered pesticides were some 1 281 products. The following Table shows total registration in 2002, 2003 and 2004.

Out of 1 281 products recorded in 2004, 209 were new registrations. New registrations have increased from year after year. Within the past three years the trend of new registration has grown at least 13–15 percent per annum. However, such a record is not available in the market since some of them are not ready to be launched. The average availability is about 45–60 percent of the total registered product.

Table 1. Progress of Registered Pesticides in the past 3 years

No.	Items	2002	2003	2004
1	Household Pesticides	221	274	184
2	Herbicides	201	282	298
3	Insecticides	201	469	421
4	Fungicides	133	197	179
5	Rodenticides	17	22	23
6	Acaricides	11	17	16
7	Bactericides	2	3	5
8	PGR	24	30	31
9	Nematicides	7	10	7
10	Molusicides	5	8	7
12	Repelent	1	1	20
13	Ajuvant	76	98	75
14	Others	2	3	15
	TOTAL	**901**	**1 414**	**1 281**

As it may happen in every country, where insecticides remain sitting in the top rank of distribution as well as registration as compared to any other pesticides. The market share of insecticide is about 34 percent indicating more insect problem are faced as compared to diseases or weed or even any other organisms. The ecosystem of insect population has been severely disturbed as insecticides were applied excessively. Some major insect pests are known to be endemic pests in certain area such as Brown Plant Hopper, Stem Borer, Fruit Flies, cabbage worm, etc. Total active ingredients of insecticides being registered in Indonesia are some 94 (ninety four). Following insecticides, herbicide takes second position in popularity being applied from fully cultivated area to tidal-swamp area. In some extent, herbicides are applied to least soil tillage (TOT) and it really works well in some area in the country. There are now more than 70 (seventy) active ingredients of herbicides registered in Indonesia, some are known as contact action and some other are translocation (systemic action).

The application of herbicides is increasing in agricultural practices since its use offers less cost in land preparation, hand weeding, and soil tillage in some heavy areas. Farmers prefer to apply more herbicides to shortcut time budgeting in cultivation to reach the best time of harvesting and earning the best price of harvested product. Production cost may be reduced up to more than 40 percent by applying herbicides compare to those are not. It is proven to be quite tempting.

The application of fungicides is mostly being done in the horticulture production centers. Disease problem on cabbage, potatoes, onion, red chili, tomatoes, paprika and many other high valued commodities exist with no indication to decline unless being controlled by fungicides. As the area of horticultural is not as large as for food and secondary crops, the use of fungicides is a little less than the application of insecticides and herbicides. But the application of fungicides from the perspective of individual is quite a lot as it is applied on interval basis to prevent the disease occurrance. Nowadays, total active ingredients of fungicides registered are 61 (sixty one).

Other pesticides such as rodenticide, nematicides, bactericides, and so on are quite small in quantity. Its use is very limited and not very common by farmers and other users.

From the table it is shown that the numbers of registration are not always increasing. The number of registration of insecticides in 2003 was 469 and declined to be 421 in 2003 due to some

withdrawals from registration and some were not evaluated any further. This illustration is always happen every single year. Thus, the total number recorded in 2004 is cumulated of the total number in registration.

De-regulation of pesticides registration not only promoted the number of registered products but also triggered the number of new registration holders. Prior to the enacting of de-regulation the total number of registration holders were 128. It increased substantially year after year and the total number of registration holders was recorded to be more than 430 holders. The following Table 2 shows in detail information on the development of registration holder during the past three years.

Table 2. Development of Registration Holders within three years (2002–2004)

No.	Item	2002	2003	2004
1	Household pesticides	69	71	72
2	Herbicides	88	97	114
3	Insecticides	65	114	94
4	Fungicides	51	53	66
5	Rodenticides	15	14	15
6	Acaricides	9	13	13
7	Bactericides	4	3	3
8	PGR	16	18	20
9	Ajuvants	34	37	23
10	Nematicides	6	5	5
11	Molus	3	4	5
12	Others	15	5	5
	TOTAL	**375**	**434**	**435**

It shows a significant increase of the total number of registration holders as compared to the number before de-regulation was officially issued by end of 2001. The major reason for this situation to occur was that there were no longer limitations in registration as it was formerly applied by rule. De-regulation was officially opened up for newcomers, new products and diversifying the scope of work of business players. Some of new registration holders were pesticide distributors or retailers. In addition, some new players also never dealt with pesticides business until de-regulation made it possible to do so. Hence, these days, the players vary from those who are quite professional to any other who are really new in doing pesticides business. Therefore strong supervision and control to its distribution has become important and is being paid more attention by the government to restrain counterfeit and vague products in the market.

Based on our observations, not all players struggle enough to compete as they should be able to provide sufficient instrument such as promotional material, extension to field workers, partnership with distributors, manufacture scheduling and so on. In fact, only those who are capable to support all those things may stay steadily in the competition.

ITEMS OF PERMISSION ISSUED

Anytime permission is issued, Ministry of Agriculture releases one package of decrees consisting of:

1. Permanent permission on new product, include those on renewal
2 Label extension
3. Permission on export product, include those on renewal
4. Temporary permission, include those on renewal
5. Permission on trial, include those on renewal

a. Permanent permission

Permanent permission will be granted as all technical and administrative requirements are completely fulfilled by the applicant. Validity data and any other technical information is the most important requirement for consideration. Complete but invalid data is subject to denial and permission would not be granted.

b. Label extension

Any additional target pest as well as commodity for label extension should comply with official procedure as it is supposed to be registered officially under the permission of Ministry of Agriculture. None of label extension is exempted from the obligation of registration.

c. Permission on export product

To any pesticide product intended for export is not required to follow the process of registration as it is for pesticides for use domestically. No trial report on toxicity and efficacy are required.

d. Temporary permission

If all data or information required may not be fulfilled as it is supposed to be, while basic information on efficacy and toxicity test are accomplished even some of them need to review further, temporary permission might be granted for one year period. Within the period, the applicant can submit additional data to upgrade the permission status.

e. Permission for trial

Pesticides for trial prior to be sold and used in the country or export must be registered and hold a permission from the Ministry of Agriculture. The permission is granted for 5 (five) years and can be prolonged for the same period.

REGISTERED CHEMICAL GROUP

The chemical group that has been registered in Indonesia comprise of:

1. Phenoxy	15. Pyrimidine	29. Sulfonilurea
2. Organochlorine	16. Quinthozine	30. Thiocarbamate
3. Phridazinon	17. Triazole	31. Amydine
4. Pyrazol	18. Thiadiazine	32. Avermectine
5. Tetrazine	19. Benzimidazole	33. Dyphenil
6. Dithiocarbamate	20. Acetamide	34. Nerytoxin
7. Phenol	21. Benzoic Acid	35. Nitro Imidazoline
8. Benzymidazol	22. Bipiridylium	36. Neonicotinoid
9. Dicarboximide	23. Phenoxy	37. Pyrol
10. Chloronitril	24. Diphenyl Ether	38. Pyrethroid
11. Imidazol	25. Quinoxaline	39. Cumarine
12. Morpholine	26. Glycine	40. Indandione
13. Organophosphate	27. Oxadiazol	41. Anylide
14. Oxazolidine	28. Cyclohexane	42. Acetaldehyde

DE-REGULATION ON PESTICIDE REGISTRATION

De-regulation on Pesticide Registration is reflected through the Ministry of Agriculture Decree No. 434.1 of 2001. It was officially implemented in September 2001. The following information is about the content of this regulation:

GENERAL DIRECTION

In the decree, the following description is given:

1. Pesticides registration is a process to obtain a registration number as well as its permission.
2. Pesticides are any chemical substances and other materials, microorganisms and virus which are intended to be used for the following:
   a. To eradicate or prevent pests and diseases that devastate crops, part of crops and agricultural products;
   b. To eradicate grasses;
   c. To eradicate leaves and unexpected growth;
   d. To regulate and stimulate plant growth and or its parts, except fertilizers;
   e. To eradicate or prevent external pests on pets and animal husbandry;
   f. To eradicate or prevent marine pests;
   g. To eradicate or prevent any animal and microorganisms in the house, building construction, transportation means, and other;
   h. To eradicate or prevent any animals causing diseases on either human being or animals by its use to plant, soil or water.
3. General use pesticides are any pesticides for which no specific particular equipment and safety tools are required.

4. Active ingredient is the chemical substance and or any other materials, as the major content of pesticide and it is generally a toxic substance.
5. Analytical standard is a pure active substance, which is intended to be used to compare the test material when analyzing pesticides content.
6. Technical material is a raw material to formulate pesticides resulting from the manufacturing process of the active ingredient and may contain impurities or certain additional substances
7. Base technical material is a substance that resulted directly from the process of synthesis, extraction or other process to generate active ingredients.
8. Processed technical materials is a substance that resulted from processing the base technical materials intended to gain safety, stability or other intention in the process of formulating, packaging, transporting and storing.
9. Formulation is a mixture of active ingredients and other materials in a certain concentration and type of formulation having an action as pesticides.
10. Any formulations with the same active are those pesticides formulations in which the entire active is technically equal.
11. The national product of pesticide formulation are those being occupied by formulation's owners who are domiciled in the Republic of Indonesia
12. Foreign product of pesticides formulation are those being occupied by formulation's owners who are not domiciled in the Republic of Indonesia
13. Formulation owners are those either individual or legal entities who own the recipe of formulation
14. Formulation recipe is information stating:
    a. Items and amount of the active and other solvent in a certain formulation;
    b. Methodology of formulating by the use of technical materials or active ingredients and other solvents.
15. Applicants are anyone either as individual or legal entity who are submitting application for registration.
16. Registration holders are those either individuals or legal entity who have held registration number and permission of pesticides as their responsibility.
17. Distribution is a mechanism of import-export, buying-selling transaction in the country include its transportation.
18. Storage is a state of being possessed pesticides as a stock keeper whether it is reserved at the yard, storeroom, traders or agriculture business.
19. The use is the application of pesticides with or without associated tools as it is mentioned in point 2 above.
20. Packaging is a physical material as a solid case, which is directly touch to pesticides.
21. Label is written information which may be accompanied by pictures and/or symbol that provide information on such pesticides, and strongly stick to the container or packaging.
22. Annihilation is proposed activity to demolish pesticides characteristic and its function.
23. Restricted use pesticide is any pesticide as its use requires special requirement and equipment other than those are described in its label.

24. The certificate of use is an official statement issued by the Chairman of the provincial/ district/city pesticides inspection committee or the official concerned who declares that the certificate holder has been habituated to the procedure of use the RUP.

25. The user are those individual or legal entity who deals with pesticides whether with or without equipment.

26. Formulation name is a trade name of formulation that is proposed to registration.

27. The name of technical grade is the trade name of technical grade that principally equal to the name of its active ingredient that is proposed to registration.

28. Pesticides residue is the remaining substance of pesticide in certain amount includes the result of its changing in body tissue of human, animals, plant, water, air or soil.

29. Acute toxicity is the adverse effect that immediately appears after exposure to a single dosage of chemical substance or other substances, or presenting double dosage in less than 24 hours period of time.

30. Chronic toxicity is an adverse effect that appears due to the present of repetitive daily intake of chemical substances or other material, or the exposure to chemical substances last on the major part of the life cycle of organism for more than 50 percent, exposure period to the guinea pig within 2 years.

31. Sub chronic toxicity is an adverse effect that appears due to repetitive daily intake of a chemical substance or other material, or the exposure to chemical substances, to the lesser parts of the life cycle of certain organism that used to be less than 10 percent, exposure period to the guinea pig within 3 months.

32. Lethal dose 50 referred to as LD_{50} is a single dosage of chemical substances or other material which is drawn statistically that could be predicted to induce 50 percent death of organisms in a series of research.

33. Lethal concentration 50 refer to LC_{50} is a concentration which is drawn statistically that could be predicted to induce death up to 50 percent of organisms in a series of experimental condition.

34. Acceptable Daily Intake further refer as ADI is a particular number to predict the daily amount of chemicals in foodstuff enable to digest lifetime with no considerable risk.

35. Maximum Residual Limit refer as MRL's is a predicted level of maximum pesticide's residue which is allowed to present on various agricultural product.

36. Lethal Time 50 refer as LT_{50} is certain period of time which is daily basis required to kill 50 percent of guinea pig population in a certain condition.

37. Decomposition Time refer as DT_{50} is a certain period of time required enable to decompose 50 percent of chemical substance.

38. Director General is Director General of Agricultural Facility.

39. Efficacy is the effectiveness of pesticides on target organisms for which to register based on the result of field trial or lab trial complies with the standard issued by Director General.

40. Pest resurgence is an evidence of the increasing population of target pest as a result from pesticide application.

41. Pest resistance is a phenomenon of population change that previously dominated by susceptible individual to be pest population dominated by resistance individual to certain

pesticides. Such a change causes pesticides used to be effective turns less effective on certain pests.

42. Irritation is a symptom of inflammation on skin or mucous membrane due to prolong or frequent application of chemical substances or other material.
43. Carcinogenic is the property of certain material inducing cancer.
44. Oncogenic is the property of certain chemical inducing tumor.
45. Terratogenic is the property of chemical substance inducing abnormality on birth.
46. Mutagenic is the property of chemical substance inducing genetic mutation.
47. Weeds are those covers grasses as mentioned in the Government Act No. 7 of 1973.
48. Prohibited pesticides are those officially forbidden to use for to all or certain uses to protect human health and sustainable environment and to comply with present regulation.
49. Risk is the probability of harmful or adverse effect to human being or environment due to pesticides or chemical exposure.
50. Risk evaluation covers qualitative and quantitative correlation between risk and benefit consists of complex process to determine the identified level of hazardous and risk identification to certain organisms or human related to or influenced by certain pesticides.

(1) This decree is proposed to be a basic regulation in order to carry out pesticide registration, include trial and its permission.

(2) The goal of this decree is as follows:
   a. Protect the community and environment from adverse effects due to pesticide application;
   b. Promote the efficiency and effectiveness of pesticides use;
   c. Promote the IPM concept.

The scope of work of this decree covers classification, registration, including permission, container/packaging and pesticide label and administrative sanction.

Field of pesticides use is among:

a. Crop cultivation
b. Livestock and veterinary;
c. Fisheries;
d. Storage of agriculture products;
e. Preservation of forests product;
f. Controlling of human disease vector;
g. Termite control;
h. Household pesticides;
i. Fumigation;
j. Other industrial pesticides such as those impregnated in paint, anti pollution; and
k. Other field.

CLASSIFICATION

(1) Based on physical-chemical properties and its toxicity, pesticides can be classified into:
   a. Pesticides which is eligible to be registered;
   b. Prohibited pesticides.

(2) Pesticides which is eligible to be registered as mentioned in point (1) a covers any pesticides not include those are in prohibited category as it is mentioned in point (3);

(3) Prohibited pesticides as mentioned in point (1) b, are those holding criteria as follow:
   a. Pesticides formulation is in the class Ia which is extremely danger and class Ib which is very danger due to WHO classification;
   b. Having LC_{50} inhalation of formulation less than 0.05 mg/l for 4 hours exposure period;
   c. Indicates carcinogenicity, terratogenicity, mutagenicity and oncogenicity evidence.

(4) Based on its application method, pesticides can be classified into:
   a. General use pesticides;
   b. Restricted use pesticides.

(5) Pesticides based on its method of application is classified as restricted use pesticides are those holding the following criteria:
   a. Pesticide formulations corrosive to eyes (causing irreversible defect on ocular tissue) or may causes squeezing of cornea or irritation up to 7 (seven) days or more;
   b. Pesticide formulations corrosive to skin (causes defect of inner dermis tissue and or left wounded) or causing severe irritation up to 72 hours or more;
   c. When it is applied as described in the label, or due to regular practices such pesticides may still causes obvious sub chronic poisoning evidence, chronic or delayed to human as resulted from single or multiple exposure of pesticides or its residue.

(6) Pesticides which are not included in such above criteria point (3) and point (4) are general use pesticides.

(7) Minister of Agriculture have full rights to change the classification of restricted use pesticides to general use pesticides or prohibited pesticides based on recommendation given by Pesticides Committee.

Pesticides contents prohibited active ingredients are as follows:

1. 2, 3, 5-T	12. Dichlorophenol
2. 2, 4, 5-Trichlorophenol	13. Dinozeb
3. 2, 4, 6-Trichlorophenol	14. EPN
4. Sodium 4-Brom-2, 5-Dichlorophenol	15. Endrin
5. Aldicarb	16. Etylene Dibromidal (EDB)
6. Aldrin	17. Red Phosfor
7. Arsonate (MSMA)	18. Halogen phenol
8. Cyhexatin	19. HCH and its isomers
9. Dichloro Diphenyl Trichloroethane (DDT)	20. Haptachlor
10. Di Bromo Chloroprophane (DBCP)	21. Captafol
11. Dieldrin	22. Chlordane

23. Chlordimefon	31. Parathion methyl
24. Leptophos	32. PCP and its salts
25. Lindane	33. Arsenic compound
26. Metoxychlor	34. Mercury compound
27. Mevinphos	35. Strichnine
28. Monosodium metham	36. Telodrine
29. Sodium chlorate	37. Toxaphene
30. Sodium tribromophenol	

(1) The application of Restricted Use Pesticides should comply to the following requirement:

a. Anyone intents to use restricted use pesticides should hold certificate;

b. Certificate could be provided to those who passed from training program on the use of restricted use pesticides organized by Pesticides Control Committee of provincial or county's level or any other officials concerned;

c. Certificate is issued by Pesticides Control Committee of provincial or county's level or officials concerned valid throughout the country for 5 year and can be extended;

d. Certification and training program on the use of restricted use pesticides is carried out as guided by technical guideline issued by Director General;

e. Legal entity is permitted to use restricted use pesticides when trained employee applies it.

(2) Pesticides that are decided to be restricted use pesticides as shown and listed in annex 1.

TYPE OF PERMISSION

The type of pesticides permission consists of:

a. Trial permission;

b. Provisional permission;

c. Full registration (permanent permission).

Trial permission

(1) Trial permission is specified by Director General on the recommendation of Pesticides Committee for 1 (one) year period and can be extended up to 2 (two) times of one year period respectively.

(2) Trial permission is given as the applicant is supposed to proof their claim related to quality, efficacy and its safety.

(3) Trial permission holders are prohibited to use or distribute such pesticides commercially.

Provisional permission

(1) Provisional permission is granted by the Minister on the suggestion and recommendation given by Pesticide Committee to those pesticides fulfilled technical and administrative requirements for 1 (one) year period and can be prolonged 3 (three) times of one year period respectively.

(2) Provisional permission is granted as the applicant is supposed to complete the lack of technical and administrative data and information as required. The application will be denied when that technical and administrative requirement is unable to be completed.

(3) For those pesticides holding provisional permission can be manufactured or distributed in limited amount set officially by the Ministerial Decree due to the number of commodity, dosage or concentration and its application.

(4) When the use of pesticides as affirmed in point (4) has proven to impose negative impact to human health and or sustainable environment, such permission might be reviewed.

Full registration

(1) Full registration or permanent permission is granted by the Minister on the suggestion and recommendation given by Pesticides Committee as all technical and administrative requirement are fulfilled by the applicant. Valid for 5 (five) year period.

(2) Pesticides holding full registration can be used and distributed on commercial basis.

(3) When the use of pesticides as affirmed in point (1) has proven to impose negative impact to human health and or sustainable environment, such permission might be reviewed.

REQUIREMENT OF REGISTRATION

The application of pesticides registration can be done by Indonesian citizen as individual or legal entity that meets the following requirements:

a. Official legal entity
b. Trade Permission issued by the Minister of Trade and Industry
c. Tax Number
d. Identity Card
e. Formulation's owner or their authorized
f. The representative office as the Indonesian legal entity who are appointed by the formulation owner

(1) Those are eligible to be registered in Indonesia are those not included prohibited pesticides

(2) Pesticides formulation consists of:
   a. National product
   b. Foreign product

(3) The national products have to comply with the following requirements:
   a. Any product belonging to either an individual or firm with the Indonesian legal entity whose eligible;
   b. Being formulated in the country or abroad by the use of technical which is produced either in the country or imported;
   c. The purities of technical complies to FAO standard or recognized national standard.

(4) Foreign products have to comply with the following requirements:
   a. Being formulated abroad while the technical is produced by formulation owner themselves or it is produced by any other parties who are in agreement with the formulation owner in producing technical;

b. Being formulated in the country while the technical is produced by the formulation owner themselves or it is produced by any other parties who are in agreement with the formulation owner in producing technical, or other parties whose produce such technical in the country;

c. The purities of technical comply to FAO standard or recognized national standard.

Submission of registration not only has to comply to the requirement as mentioned above but also has to fulfill the following requirement:

a. Any formulation produced by the formulation owner, which is intended for all field of usage, have to be registered on behalf of one single applicant;

b. Formulations with identical active ingredient whether single or multiple which is produced by one formulation owner and is intended to use to one specific field of usage is only can be registered on behalf of one applicant;

c. Formulations in identical type as well as its active ingredients whether single or multiple whish is produced by one owner, and is intended to use to one specific field of usage and by the use of similar equipment, there is only one formulation can be registered by one applicant.

Pesticides formulation with multiple active ingredients for all use must not generate antagonism effect and may help reduced negative impact to the natural enemies and environment.

(1) All pesticides for registration must be specified through its own name as it identifies each formulation that will be distributed;

(2) The trade name as mentioned in point (1) may not be the same or similar to any registered formulation;

(3) The trade name as mentioned in point (1) has to comply the following requirement:

a. Each formulation is only been given one trade name consists of 3 (three) elements i.e. the name not related to common name and or the name of active ingredient, number that shows the concentration of the active ingredient and code that shows the formulation type;

b. Each formulation name for registration must be accompanied by the verified document of registration of the intellectual proprietary rights (IPR);

c. Any formulation with equal active ingredient can only be registered on one trade name for one single field of usage;

d. Any formulation with different active ingredient of one formulation’s owner can only be registered in different trade name for any field of usage;

e. Any formulation with multiple active ingredients in which one of them is equal to the active ingredient of other formulation for any field of usage of the same formulation’s owner can be registered in the same trade name;

f. The name of formulation as described in the letter a through e are not supposed to be provocative such as super, bombastic, strong and so on.

(4) The trade name of technical have to comply to the requirement as described in point (3) and have to be pursued by number and code that shows concentration of its active and type of technical respectively.

PROCEDURE OF REGISTRATION

(1) The application for registration is submitted officially to Director General of Agriculture Facility with sufficient legal stamp based on the existing regulation by the use of the application form as shown in annex II of this decree.

(2) The application as described in point (1) is accompanied by complete set of requirement as the directive that is mentioned above.

(3) The application can be accepted when all requirements as mentioned above by completing all necessary information required in the application form.

(4) Once the application of registration is accepted as mentioned in point (1) in a complete set and properly, Director General within 30 (thirty) days at the latest has done in checking and evaluating all document collaborating with Pesticides Committee.

(5) After being evaluated as mentioned in point (4) based on suggestion and recommendation of Pesticides Committee, Director General within 14 (fourteen) days at the latest granting Trial permission, suspending or denying.

(6) In case of suspension or detention of application as mentioned in point (5) Director General shall inform the applicant with sufficient reasons on written notice.

(5) The applicant will be granted prolonged opportunity to complete or renew all related documents once Director General issuing the notice as mentioned above.

(6) After obtaining Trial Permission, the applicant submit pesticides sample immediately to Director General to process quality assurance test at the accredited laboratory. In case of lack of accredited laboratory, such a test may be done by recognized laboratory.

(7) The result of quality assurance test as mentioned in point (6) must be submitted to Director General and the Director General within 7 (seven) working days has evaluated by applying standard methodology set up by Director General on the suggestion of Pesticides Committee. When such sample fulfills the requirement, it will be sealed.

(3) In case of the result of quality assurance test of the sample as mentioned in point (7) do not meet the requirement, Director General will inform the applicant to redo such a test.

(8) Once the applicant obtained tested sample as mentioned in point (7) immediately submit the sample sealed by Director General to accredited research institute or other research institutions appointed by Director General to execute efficacy and toxicity test.

(9) The efficacy test as well as toxicity test that will be done by such institution as mentioned in point (8) should comply to the standard methodology set up by Director General base on the recommendation of Pesticides Committee.

(10) When all test are done, the research institute should provide test report to the applicant as one copy is also being addressed to Director General.

(11) The test result as mentioned in point (10) is submitted to Director General officially by the applicant for further evaluation comply to the procedure of evaluation technical data.

(12) Based on evaluation as mentioned in point (11) the application for registration may be accepted or refused.

(13) Director General on the suggestion of Pesticides Committee within 90 (ninety) days at the latest has submitted the draft of minister decree.

(14) The Minister of Agriculture Decree with regards to the number of registration and temporally permission is set up when:

a. Further tests on its safety to the environment and human health are needed;

b. The present of efficacy data was done by other than the institution as mentioned in point (9).

(15) The procedure of registration as mentioned above through are also applicable to the registration of technical and pesticides for export but the following tests i.e. efficacy, environment toxicity, resistant, resurgence and residual.

(16) The application form for technical registration is provided.

(17) The registration number that has been granted whether in the temporally permission of full registration could be transferred or be moved due to:

a. The formulation owner appointed other party as the registration holder;

b. The formulation owner transferred its ownership to other party;

c. Other party has been appointed as the registration holder due to the company's merger;

d. The change name of formulation owner or the registration holder.

(18) The party who are assigned as the new registration holder as mentioned in point (17) are required to elucidate any problems due to such change between the previous and the present holder and then report it to the Director general as the Director General will proceed such change to be set up.

(19) The alteration on the registration consists of the change of:

a. The name of formulation or technical;

b. Wrap and packaging;

c. Source of technical.

(20) Any changing as mentioned in point (19) must be reported by the registration holder to Director General for further process.

(21) Pesticides hold full registration that has expired might be reregistered by following the procedure as described in this decree.

(22) To reregister such permission as mentioned in point (21) has to be done 2 (two) months before expiration date. When it is not being done the registration number and its permission is terminated due to the law.

(23) In the process of re registration as mentioned in point (222), new test might be required as the indication of negative impact is in evidence.

(24) The kind of test to obtain new data as mentioned in point (3) are set up by Director General based on the recommendation of Pesticides Committee.

(25) The decision of Director General to execute the test as mentioned in point (24) is informed to registration holder within 2 (two) years before expiration date at the latest.

PACKAGING AND LABELING

Labeling

(1) Any pesticides holding Temporally permission as well as full registration must be placed in particular container.

(2) The container must not so delicate or tore or being protected by another container as it will not easy to shred, does not react to pesticides or corrosive as it brings no harm to human being and environment.

(3) Each container must be properly closed or folded or such fold can not be opened unless destroying it except without destroy it, the pesticides can release on the form of fog.

(4) The specification of container must be thoroughly described consists of volume, name of material, shape, size, thickness of material, color, coated of the inner side and material of cap.

Packaging

(1) Each container must be given label that is strongly stick as it does not easy to lose or direct printed on the container.

(2) The registration holder and as being requested for registration suggest Pesticides label

(3) All information describe on the label and its attachment are written in Indonesia whereas foreign language are acceptable only for translating the important information for which also being mentioned in Indonesia.

(4) Information and warning signs of hazards on the label must be clearly printed out, easy to be read or seen and resist to pesticides and un erasable.

(5) Complete information of label content, warning statement and safety guidelines, symptom of poisoning, first aid information, storage, direction of use, pictogram, label for restricted use pesticides and the organizing of label as mentioned in annex of this decree

RESPONSIBILITY OF OFFICER AND REGISTRATION HOLDER

(1) Officer or researchers of research institutions, laboratory and service officers have to keep the truth and stay classified all data and information as due to its characteristic need to be kept confidential.

(2) Directorate General have to organize a book of registration number and record anything regarding transformation of whether subject or object of registration.

(1) Registration holder has to declare the number of registration on the container/packaging and or label.

(2) Registration holder has to pay registration fee as the government revenue of non taxes and must be executed to the government's treasure as its amount is set up by law.

(3) Registration holder will bear all experiment expenses as for such amount and procedures will be set up by the institution concerned.

(1) Registration holder has to submit 2 (two) grams of analytical standard accompanied by its certificate of analysis once in two years to Director General to be kept at the laboratory

(2) Registration holder has to submit annual report on production and distribution as well as its technical consists of import export and domestic transaction, and 6 (six) monthly report on production and distribution of restricted use pesticides to Director General by the use of reporting form as annex VIII.

(3) Registration holder of the restricted use pesticides has to provide product stewardship and taking any action on adverse affect due to misuse pesticides.

ADMINISTRATIVE SANCTION

To the institution and or experimental laboratory who are proven unable to secure the secret and the truth of test result that was done, will be given written correction by Director General and will be reported to the authorized concerned for further sanction based on law.

Service officer in registration who are proven unable to secure the secret of data will be laid a discipline sanction for government official due to government law.

(1) To the registration holders who are proven not to declare number of registration on label and or unable to assure the quality or neglect to report the evidence of the change of registration holders will be laid a sanction which is withdrawn such number of registration, its permission and distribution.

(2) Registration holders who have never been producing and or importing or never been reporting for 2 (two) consecutive year will be laid sanction which is withdrawn the number of registration and the product.

TRANSITION RULE

(1) Any pesticides when this decree is enacted has been registered and holding full registration or temporally permission is being granted up to the expiration date.

(2) Any pesticides when this decree is enacted have been on going process of trial intended for registration, will be proceeding comply with the old regulation.

(3) Any pesticides when this decree is enacted have been applied for registration whereas none of trial is being done, the applicant should comply with this regulation.

(4) Any registered pesticides with the trade name set up prior to this decree, should be reregistered with the trade name complies to this decree.

QUESTIONNAIRE SUMMARY

Indonesia

Selected Country Statistics:

Agricultural Population	**93.0 million**	**Agricultural Land**	**33.7 million ha**
GDP $208 311 million	Agric. GDP: 17.5%	GNI per capita: $810	Hunger: 6%
FAOSTAT Pesticide Data	Export $48.7 million	Import: $50.3 million	Use: ton

GDP = Gross Domestic Product; GNI = Gross National Income; Hunger = Population below minimum energy requirement; FAOSTAT = latest data entry between 1998 and 2002

Institutional Profile

Ministry	**Legislation**	**Registration**	**Licensing**	**Enforcement**	**Testing**	**Training**	**Monitoring**	
							Environm.	**Health**
Agriculture								
Environment								
Health								
Other				Police				

Industry Associations:
Non-Governmental Associations:

A. Pest and Pesticide Management	
IPM policy declared?	**Yes**
IPM mentioned in…	
Crop Protection Policy?	**Yes**
Agric. Sector Policy?	**Yes**
Other laws/documents?	**Yes**
National IPM Program?	**Yes**
Dept:	
IPM extension projects?	**?**
IPM research projects?	**?**
Pest resistance problems?	**Yes**

B. Testing, Quality Control and Effects	
Laws for pesticide specifications?	**Yes**
Low quality products in market?	**Yes**
Quality control laboratory?	**Yes**
Own analyses in 2004:	
Outside analyses in 2004:	

C. Health and Environmental Information	
Data on pesticide poisoning cases?	--
occupational exposure cases:	
accidental exposure cases:	
intentional/suicide cases:	
Pesticide poison facilities?	--
Number of facilities:	
Poison Information and Control Centers?	--
Number of centers:	
Significant environmental contamination?	**Yes**
Data on effects on wildlife & ecosystems?	--
Pesticide residue monitoring system?	--
Number of analyses 2004:	

D. Pesticide Manufacture, Use and Trade		
Pesticide Volume	*Tons*	*$'000 Value*
Imports		
Manufacture		
Exports		
Sales		
Pesticide Use Profile	*Tons*	*$'000 Value*
Agriculture (total)		
Insecticides		
Fungicides		
Herbicides		
Other		
Veterinary		
Public Health		
Household		
Other		
TOTAL		

E. Selected Standards of Code of Conduct	
Illegal trade estimates?	--
Estimated amount 2004	
Collection of old containers and pesticides?	**Yes**
Inventory of outdated/obsolete products?	**Yes**
Operational pesticide registration system?	**Yes**
Violations in 2004	
Existing facility licensing system?	**Yes**
Inspections in 2004	
Highly toxic products restricted?	**Yes**

Questionnaire responses: Yes = Yes; -- = No; ? = don't know; (blank) = no answer

LAO PEOPLE'S DEMOCRATIC REPUBLIC

by Somsak Kethongsa

Introduction

Lao PDR is located in the South East Asian Region, sharing its border with five countries: China to the north, Cambodia to the south, Viet Nam to the west and Myanmar and Thailand to the east has the total population of 5.5 million and the population density of 18 persons/km.

Agriculture is the most important sector in Lao PDR, accounting for about 56 percent of the GDP and employing approximately 80 percent of the labor force. Crop production is largely dominated by paddy rice, which represents approximately 90 percent of crop production and 80 percent (650 000 ha) of annual cultivated cropland. Other important crops include maize, job-tear, coffee, beans, vegetables and fruit-trees.

In the past few years and especially since 1996, agricultural production increased as a consequence of more coherent agriculture development policies and strategies and more harmonized and focused investment efforts in the agricultural sector. In 2000 rice cultivated area was total 718 000 ha, with the rainfed area of 475 000 ha and the irrigated area of 91 000 ha and the upland area of 152 000 ha. Rice production totaled 2.2 million tons. The Lao government has the policy of promoting commodity production of crops and vegetables were also promoted with increasing vegetable-cultivated area of 104 000 ha in 2000 to 123 000 ha in 2003.

The country's rice production in year 2000 has reached a record output of 2.2 million metric tons. With the said record output, Lao PDR is basically self sufficient on rice. This is equivalent to 400 kg of rice per capita or increase 50 percent in production as compared to the rice production in 1986.

The increase in dry season irrigation infrastructure and better agro-technical practices such as: increases the use of improved seeds, organic and inorganic fertilizer has contributed to a large extent to the record rice production. Beside rice, with increased diversification of the agricultural systems; the production of cash crops, vegetables and fruits has also increased significantly.

The use of agricultural inputs still is being very low in Lao PDR; pesticides have not been regarded as a prime factor in improving yields. Application of pesticides will continue to be very low, if no increase in the use of inputs has been initiated. In general, the tropical monsoon climate of Lao PDR is conducive to supporting a variety of pests. Pest incidence may become more acute with the introduction and extensive cultivation of new and high yielding crop varieties.

The most important insect pests of rice are stem borers, gall midge, brown plant hopper, rice bug, grasshoppers and others. Insect pests of other crops have not yet been systematically recorded although several have been observed in fruits, vegetables, roots and tubers. Other important pests causing damage in crops are snails, craps, mice, rats. Snails and crabs can destroy part of the rice crop in wetland rice. Rats can cause severe damage on cereals.

The use of chemicals in plant protection is of relatively low importance in Lao PDR. The country does not produce any active ingredients, nor does it formulate any pesticides locally. All pesticides are then imported and used mainly on dry-season irrigation rice, vegetables and marketable high-value crops.

Before 1988, only the Ministry of Agriculture and Forestry was responsible for imports of pesticide. Presently, pesticides are imported through three channels such as:

a. Private companies who are formally registered with commerce authorities.

b. Smuggling from neighboring countries in to Lao PDR by traders or farmers.

c. Introduction by the international assistances programme and donors.

In order to make great contribution to agricultural development and supply of raw materials to the industrial sector for domestic requirement, the government set the policy of promoting the commodity production and also initiative of clean agriculture production to farmers by the appropriate IPM techniques, minimizing the chemical control and promoting the biodiversity conservation in Lao PDR.

Regulatory work

In 2000, Regulation on Use and Management of Pesticides in Lao PDR, No. 0886/MAF, dated 10 March 2000 was promulgated by the Ministry of Agriculture and Forestry with the objective of managing all kinds of pesticides in the country. This has been used as the reference for the pesticides management. The WHO Recommended Classification of Pesticide by Hazard and FAO Guideline to Classification 1994-1995 were recognized by the Government of Lao PDR.

In 2002, Plant Protection Center was established for the purpose of testing pre and post harvest agriculture inputs, testing of chemical residues in agricultural products, testing of the imported pesticides, monitoring and diagnosis of the insects and their outbreak. Since there is a lack of technical staff and equipments, work at the center is currently implemented in very limited aspects.

Legislation of pesticides

All kinds of pesticides imported and used or exported through Lao PDR are under the responsibility and control of the Ministry of Agriculture and Forestry, which is the main mandate of the Department of Agriculture. Both public and private sectors who has the purpose to import or export pesticides have to be granted by Ministry of Agriculture and Forestry.

Department of Agriculture is responsible for legislation of all kinds of imported pesticides. Therefore, all shops who import pesticides for distribution in Lao PDR have to make formal registration of the pesticides such as quality, country of origin and simple of the imported pesticides and submitted to Department of Agriculture for registration and import permission.

List of pesticides divided into 6 groups as follows:

1.	Insecticides for thrips and insect control	19 kinds
2.	Pesticides for rat control	3 kinds
3.	Pesticides for golden apple snail	3 kinds
4.	Fungicides	10 kinds
5.	Herbicides	5 kinds
6.	Pesticides for nematode	2 kinds

There are also 26 kinds of pesticides which are prohibited for usage in Lao PDR.

A. List of permitted pesticides in Lao PDR

No	Commonnam	Trade name	WHO
1. Insecticides			
1	Acephate	Orthin 75 Sp	3B
2	Cabaryl	Sevin, Dicarbam, Vatavaryl	2B
3	Carbofuran	Furadan. Curaterr	2B
4	Carbosulfan	Poss. camang. Marsell	2B
5	Cartap	Padan	2B
6	Cyfluthrin	Baythroid, Solfac, Tampo, Responsor	2B
7	Cyhalothrin	Grenade. Kalata	2B
8	Cypermethrin	Ripcord. Ambush. Barricade. Sherpa. Sciplo. Supperkill	2B
9	Deltamethrin	Decis, Kothrin, Bustoss, Cislin, Crakdown	2B
10	Diazinon	Bazudin, Bassa	2B
11	Dimethoate	Cygon, Fostion M.M, Rogor, Roxion, Perfekthion	2B
12	Ethrofenprox		
13	Endosulfan	Thiodan. Thionex. Endocel.	3B
14	Fenitrothion	Sumithion. Tronifan	2B
15	Fenvalelate	Sumi 35, Sumicidin, Sunrold	2B
16	Isoprocarb	Mipc, Carbacor, Mipcin, Micap, Ethrofolan	2B
17	Malathion	Malathan, Malaphos, Malaphate	3B
18	Methamidaphos	Sonnata, Monthana, Natarin, Monitor, Tamaron	3B
19	Methomyl	Miller. Methavin. Newdrin. Lannate	1B
2. Pesticides for rat control			
1	Coumatetralyl	Racumin	1B
2	Wafarine	Warfarin, Coumafenw, Zoocoumation, Coumarine	1B
3	Zine phospide	Celphos, Phostoxin, Quickphos	1B
3. Pesticides for golden apple snail			
1	Niclosamide	Baylluscide	
2	Copper Sulphate	Bordeaux mixture	2B
3	Metaldehyde	Hallzan, Metason, MifaSlug	3B
4. Fungicides			
1	Benomyl	Benlate	3B
2	Cabendazim	Bavistin, Delsin	3B
3	Carboxin	Culator	
4	Captan	Captac, Merpan, Phytocape	
5	Copper oxychloride	Coppicide	3B
6	Edifenphos	Hinosan	1B
7	Zineb	Lanocob	
8	Mancozeb	Dithane M 45	
9	Maneb	Dithane M 22, Mazin	
10	Sulphur	Herovit	
5. Herbicides			
1	Alachlor	Lasso, Lazo,	3B
2	Atrazine	Atrex, Atratal, Gesaprim, Vectal	
3	Butachlor	Machete, Lambast, Bunex	
4	D	Hedonal, Weeder	2B

No	Commonnam	Trade name	WHO
5	Dluron	Cramlnon, Arelon, lp 50, Tolkan, Modown	
6	Glyphosate	Round up	
7	Oxadiazon	Ronstar	
8	Propanil	Sucoper. stam-ŒF.34	3B
9	Simazine	Gesatop. primatol. Aquazine	
6. Pesticides for nematode control			
1	Ebufos	Rugby	1A
2	Ethoprophos	Mocap	1A

B. Pesticides which is prohibited to use in Lao PDR

1	2, 4, 5 T	14	TEPP
2	DDT	15	Sodium chlorate
3	Aldrin	16	EDB
4	Endrin	17	Captafol
5	Dieldrin	18	Fluoroacetamide
6	Chlodimeform	19	Sodium fluoasetade
7	Heptachlor	20	Cyhexatine
8	Toxaphene	21	Daminocide
9	EthylParathion	22	Binapaccryl
10	Leptophos	23	Dinoseb
11	BHC	24	Methyl parathion
12	Sodiem Arsenite	25	Methyl parathion
13	MEMC	26	Monocrotophos

Testing of chemical residues in agricultural products

Testing for chemical residues in agricultural products is new for Lao PDR which all staff are currently trained for both technical terms and laboratory equipments. Testing for chemical residues in crops was made at the farmer's fields in Vientiane Capital and some vegetables in the local markets of Vientiane Capital were randomly tested. Testing activities have been carried out in limit aspects since the laboratory and its equipments in Plant Protection Center are considered as basic tools with capacity of testing only 2 groups of pesticides such as Carbamate and Organophosphate.

Use and distribution of pesticides in Lao PDR

All pesticides used in Lao PDR are imported from nearby countries such as Thailand, Viet Nam and China. The pesticides imported for distribution comprise of pesticide, fungicide and herbicide with increasing price when distributed in the agricultural shops, retail shops at the villages and at the market. Pesticides are distributed to farmers in three channels:

A. Distribution by companies and farms: Pesticides popularly applied for only some kinds of vegetables are imported and directly distributed to regular clients by distributors and these pesticides are only applied for high-price vegetables such as tomatoes, chili, radish, and water melon.

B. Distribution by agricultural inputs distributors: Pesticides are imported and distributed to the agricultural inputs distributors and later distributed to farmers.

C. Distribution by distributors → agricultural inputs shop → retail shop → farmers: Pesticides are transferred to the shop and later distributed to local shops in the local villages and market places by local traders and finally distributed to farmers.

According to the data collected at the biggest agricultural inputs shop in Vientiane Capital, all kinds of liquid pesticides are about 40 litres while the powder pesticides amounted to 36 kg.

Besides formal import of pesticides, there are also pesticides illegally traded along the border and some of them are prohibited such as Folidol since high rate of chemical residue and highly toxic content.

Safe pesticide placement can be seen at the big and medium sized shops in Vientiane Capital, Savannakhet and Champassak Provinces.

Pesticides are displayed unsafely at small shops in urban areas or markets where the pesticides are placed together with different kinds of products.

Pesticide application for rice and fruit tree has been considered low, while pesticides are mainly applied by farmers to vegetables such as leafy vegetables, yard long bean, cucumber and water melon. Farmers who are aware of pesticide hazard especially farmers who attended the Farmer Field School, obtaining the IPM experience, have followed the techniques such as self-protection and harvested their crops 7 days after pesticide application.

However, there are some farmers who are not aware enough of pesticide application, too many kinds of pesticides are applied together as so-called 'cocktail' and earlier harvesting their crops which provided negative impact to consumers as well as user themselves.

Currently Lao government is making an effort of improving pesticide use and management system in order to apply effective measures to management and prohibition of pesticides illegally imported and distributed without registration.

To encourage farmers for safe pesticide application, Lao government through the radio programme has disseminated farmers the hazard aware of pesticide and safe pesticide application.

IPM project plays an important role of disseminating farmers the technical information upon IPM techniques for their crop production and IPM activities are mainly carried out in the northern, central and southern parts of the country.

Conclusion

Generally speaking, pesticide use in Lao PDR is considered low and still less impact to the environment; however, when the agricultural development increases together with the increasing requirement for agricultural development, it is certain that need of agricultural inputs such as new seeds varieties, fertilizer and pesticide will increase. Currently, activities of plant protection in Lao PDR are carried out in limit aspects:

- There are differences in people's socio-economic status for production and ecosystem.
- There is a lack of technical staffs for pests, plant diseases and weeds identification.
- Lack of information on pest circle and outbreak relatively caused by climate change.
- Pesticide management system is still limited in term of public awareness.
- Lack of financial support and equipments required for plant protection system.

To strengthen ecosystem, plant protection in Lao PDR needed strong improvement and upgrade in certain status.

QUESTIONNAIRE SUMMARY

Lao PDR

Selected Country Statistics:

Agricultural Population	**4.2 million**	**Agricultural Land**	**1.0 million ha**
GDP $2 036 million	Agric. GDP: 50.9%	GNI per capita: $320	Hunger: 22%
FAOSTAT Pesticide Data	Export $	Import: $0.1 million	Use:

GDP = Gross Domestic Product; GNI = Gross National Income; Hunger = Population below minimum energy requirement; FAOSTAT = latest data entry between 1998 and 2002

Institutional Profile

Ministry	**Legislation**	**Registration**	**Licensing**	**Enforcement**	**Testing**	**Training**	**Monitoring**	
							Environm.	**Health**
Agriculture		PPC	PPC	PPC	PPC	PPC	PPC	PPC
Environment								
Health								

Industry Associations:
Non-Governmental Associations:

A. Pest and Pesticide Management	
IPM policy declared?	--
IPM mentioned in…	
Crop Protection Policy?	--
Agric. Sector Policy?	**Yes**
Other laws/documents?	**Yes**
National IPM Program?	**Yes**
Dept: **PPC**	
IPM extension projects?	**Yes**
IPM research projects?	--
Pest resistance problems?	--

B. Testing, Quality Control and Effects	
Laws for pesticide specifications?	**Yes**
Low quality products in market?	**?**
Quality control laboratory?	--
Own analyses in 2004:	
Outside analyses in 2004:	

C. Health and Environmental Information	
Data on pesticide poisoning cases?	--
occupational exposure cases:	
accidental exposure cases:	
intentional/suicide cases:	
Pesticide poison facilities?	--
Number of facilities:	
Poison Information and Control Centers?	--
Number of centers:	
Significant environmental contamination?	--
Data on effects on wildlife & ecosystems?	**?**
Pesticide residue monitoring system?	--
Number of analyses 2004:	

D. Pesticide Manufacture, Use and Trade		
Pesticide Volume	*Tons*	*$'000 Value*
Imports	**<10**	
Manufacture	**0**	
Exports	**0**	
Sales	**NA**	
Pesticide Use Profile	*Tons*	*$'000 Value*
Agriculture (total)	<**10**	
Insecticides		
Fungicides		
Herbicides		
Other		
Veterinary	**NA**	
Public Health	**NA**	
Household	**NA**	
Other		
TOTAL		

E. Selected Standards of Code of Conduct	
Illegal trade estimates?	--
Estimated amount 2004	
Collection of old containers and pesticides?	--
Inventory of outdated/obsolete products?	**Yes**
Operational pesticide registration system?	**Yes**
Violations in 2004:	
Existing facility licensing system?	**Yes**
Inspections in 2004: **6**	
Highly toxic products restricted?	**Yes**

Questionnaire responses: Yes = Yes; -- = No; ? = don't know; (blank) = no answer

MALAYSIA

by Md Sufian Yek Bin Md Juni Yek

Introduction

The Pesticides Act of 1974, the principle legislation for the control of pesticides in Malaysia, is implemented by the Pesticides Board which comprises various heads of government agencies, and is under the jurisdiction of the Department of Agriculture. Simultaneously, the role in the implementation of the *Code of Conduct on the Distribution and Use of Pesticides* too lies under the responsibility of the Department of Agriculture.

There are presently seven subsidiary legislations being enforced in the area such as registration, importation for research and education purposes, labelling, licensing for sale and storage for sale, highly toxic pesticides, advertisement, and pest control operators.

Some of the significant amendments recently made to the Pesticides Act 1974 include the imposing of heavier penalties for all offences, the control of the importation of pesticides as a registration sample or an analytical standards, the control of possession or use of unregistered pesticides and unapproved use of pesticides, the mandatory requirement impose onto the pesticide offender to pay for the pesticide disposal charges and so on.

Among the other laws enacted to control other specific aspects of pesticides are:

1. The Hydrogen Cyanide (Fumigation) Act 1953 which controls the fumigation of premises including ships using either hydrogen cyanide or methyl bromide.
2. The Environmental Quality Act 1974 has the primary objective of controlling the discharge of waste including pesticide from factories into the environment in such volume, composition or manner so as not to cause adverse effects on human health and the environment.
3. The Food Act 1983 of which Schedule 16 of its Food Regulations 1985 prescribe the maximum residue levels of pesticides in food.
4. The Occupational Safety and Health Act 1994 provides the legislative framework to promote, stimulate and encourage high standards of safety and health of workers at work.

A. Pest and pesticide management

In Malaysia, the National IPM committee is established to oversee the development and implementation of IPM on various crops. The Chairman of the National Committee is the Secretary-General of the Ministry of Agriculture and Agro-based Industry while Department of Agriculture is the secretariat to the National Committee. The other members of the Committee comprise other related agencies in Malaysia.

The concept of IPM was first introduced into Malaysia in the 1960s. With surging problem of pest resistance and resurgence in the seventies, the government began to embark more on IPM as a pest control tool. The implementation of IPM principles and the practices in Malaysia was a gradual yet continual process. Notably, IPM was first implemented in rubber (Rao, 1969), cocoa

(Wood 1971; Conway, 1971), oil palm (wood 1971), rice (Lim, 1970; Jusoh et al., 1980, and coconut (Ho et al., 1971; Ooi et al., 1975).

The promotion of IPM generally falls on the shoulders of governmental agencies like DOA and Malaysian Agricultural Research Development Institute, particularly for non-plantation crops. However, private research and development set-ups belonging to major plantation agencies are usually involved in IPM of major pests of plantation crops.

IPM programs on rice and *Plutella* were the forerunners of Malaysian IPM endeavours and the program on rice is actively implemented through the modified *Training and Visit* system. But IPM programs on *Plutella* have slowed down due to poor cooperation from farmers. In 1999, commodity based IPM committee was initiated to expand the utilization of IPM in fruit production especially *carambola* for export. Currently pest control in oil palm, coconut, and cocoa, is viewed in a much broader sense and the emphasis is on integrated pest control approaches. Nevertheless, there are regular interactions between both government and private agencies to promote IPM throughout the country for many crops.

To date, the IPM approach has created some measurable impacts in various crops in Malaysia. Some of the other significant development includes:

Rice IPM

DOA encourages the use of bio-control of pests by means of predators, which help to reduce the number of pests at a manageable level without the need for pesticides. An example of is the use of barn owls *(Tyto alba (Scopoli))* as a primary component in the control of rodent pests especially in rice. Other alternatives include duck rearing in paddy fields to control weedy rice and weeds, and fish culture in rice fields to increase farmers' income.

Vegetable IPM

- The IPM technology for DBM is dynamic as it is undergoing modification and improvement with the new research findings continually made available. Others to control chilli virus on chillies is being developed and extensive field evaluation is being conducted.
- Vegetables farmers are using of 'yellow flood light' to control lepidopteran pests which have an influence on the growth of plant and insect population in some vegetables. Farmers in these areas are able to produce healthy crops by using only class 3 or class 4 pesticides, which has a short pre-harvest-interval.
- The use of sex pheromones to detect and control pests such as *Plutella xylostella, Spodoptera litura* and *Spodotera exigua.*
- Greenhouse planting/aerophonic system or fertigation – these technologies of planting crops without the soil are being practiced and have expanded with the intention to reduce the pesticides usage. In addition, sex pheromones and sticky traps are widely used to reduce pest populations within the greenhouse environment.

Fruit IPM

Communal based mass trapping is being undertaken to reduce in-field fruit fly population within the fruit orchards. Continuous mass trapping helps to reduce the endemic population provided other cultural control methods are carried out effectively.

Policy development

Policy development in the country also indirectly contribute to the reduction in the use of pesticides such as the discontinuity of pesticide subsidies in paddy areas, development of IPM/ICM programmes for new crops, introduction of organic farming for production food crops, certification of farms with GAP, zero burning policy during replanting of major crops, and the pesticide risk reduction program by the Pesticides Board.

The major drawback of IPM is that general recommendations are not feasible for varied environmental conditions even within a single crop. The use of IPM alone may not be sufficient, but a more holistic approach which takes into consideration of good crop management and cultural practices such as crop rotation, use of resistant varieties, accurate matching of fertilizers inputs to crop requirements and where possible, use of biological control, may be the long term solution to the problems faced by the agricultural sector. Some of the plans of action to improve the situation are:

- Development of more crop-based IPM packages should be encouraged and should cover all non-chemical methods of pest control;
- A national centre for coordinating all IPM activities, developments and setting of national targets should be set up.

B. Testing, quality control and effects in the field

Concerns on quality of pesticides offered for sale, and improvement efforts

The quality of pesticides offered for sale are strictly controlled from the onset of registration of a pesticide to ensure that only those that meet the safe and effective specifications are allowed for use in the country. There is, however, still cause for concern due to the availability of adulterated and imitation pesticide products in the market. These pesticides are usually inferior in quality and pose greater hazard to human health and environment. Some of the following plans of actions to improve this situation are:

- To enhance and intensifying investigation;
- Awareness and education of the farmers/users;
- Industry to take appropriate steps by upgrading security features and monitoring their sales activities more closely;
- Collaborative efforts with the Custom at the point of entry to prevent smuggling.

Pesticides specifications compliance

Pesticides submitted for registration must conform to FAO/WHO specifications. Other specification like Malaysian Standards or even the registrant own specification can be accepted in the absence of FAO/WHO specifications. The conformation also applies to the contents and levels of impurities of the pesticide.

Efforts made to control and enforce pesticide quality standards

Several efforts have been made to ensure pesticide quality standards are properly controlled with the following actions being put into place:

- Legislation makes it mandatory for the cancellation of pesticides of inferior quality;
- The registrant is required to submit 5-batches analysis report and profiles of impurities with sample of chromatograms (for technical material only) at re-registration;
- Intensifying investigation and collect more market samples for monitoring purposes;
- Controlling the source of technical active ingredient.

Laboratories facilities for monitoring pesticide quality

A formulation laboratory in the Department of Agriculture has been set up since some thirty years ago to check or monitor pesticide quality submitted for registration. The laboratory is capable of analysing the majority of active ingredients registered in Malaysia.

Effort made to monitor pesticide use in the field

Little collaboration exists between the government and the industry to monitor pesticide use in the field. As far as Malaysia is concerned, there have been no adjustments to the interval period from last spray harvest.

C. Health and environmental information

Effort made to monitor the effects of pesticides on human health and environment

Few studies to monitor the effects of pesticides on human health have been undertaken by universities in the country. The Ministry of Health, through the Food Act 1983 under the Food Regulations 1985 stipulates the maximum residue limits of food, while the Department of Environment monitors the effects of pesticides in the environment. Some local universities and research institution are also conducting studies on the effects of pesticides in the environment.

Occupational poisoning cases among farmers and industrial workers

There are in fact some surveys on occupational poisoning cases among farmers and industrial workers carried out by the universities, but there is no cause for alarm because there is legislation to minimize the occurrence of poisoning at work. The main Act that control worker safety and health is the Occupational Safety and Health Act 1974 and the rules and regulations prescribed under the Act thereafter, and to a lesser extent, the Pesticides (Highly Toxic Pesticides) Regulation, 1996 which control only the use of certain highly toxic pesticides such as *methamidophos* and *monocrotophos* only.

In 2004, Ministry of Health only recorded 53 occupational poisoning cases while compared to 114 cases reported in 2003.

Under the pesticide extension programme undertaken by DOA, farmers are trained and educated on the safe use of pesticides. There are stewardship program carried out by individual pesticide companies with the aim of disseminating information on safe use of pesticides to farmers.

Environmental contamination and specific incidents

The Environmental Quality Act 1985 controls the discharge of toxic waste or effluents including pesticides from factories into the environment and is regulated by the Department of

Environment. The Department of Agriculture also carries out monitoring of pesticide residues in surface and ground water as part of the post registration monitoring activities. Analysis results show that pesticides detected are well within the allowable values.

D. Trends in pesticide manufacture, use and trade

Data on pesticides imported, exported, manufactured, formulated and sold

Malaysia has a mechanism of monitoring the import of pesticides into the country by means of e-permit using the Dagang net. In the year 2004, statistic reveals that 51 065.51 metric ton was imported, and some 45 193.79 metric ton were brought into the country in 2003.

The Malaysian Crop Life & Public Health Association (MCPA), which represents the pesticide industry in Malaysia in their Annual Report 2004, reported that the total Malaysian agrochemical market in 2004 was RM 323 million ($85 million) and the use of pesticides grew by 3.5 percent in 2004 over the previous year 2003.

According to the Department of Statistic, Malaysia, the total export value of herbicides was RM 120 million in 2001, insecticides RM 22.6 million, and fungicide RM 30 million.

The data collected by both the government and the pesticide industry may not be comprehensive and representative in the sense that there is still a lot to be done especially in view of the fact that not all the relevant provisions like pesticides export and pesticides manufacturing under legislative control have so far been implemented.

Illegal trade in pesticides

It is undeniable that there are cases of illegal trade in pesticide recorded but it is not significant and does not pose a serious problem in Malaysia. With the introduction of the amended penalties, it is hoped that any would be offender would be deterred from indulging in the illegal trade of pesticides. Moreover the government and pesticide industry are working hand-in hand in combating the illegal pesticide trade in the country by means of various strategies drawn up under the multimedia and enforcement campaign.

E. Selected standards

Government and industry effort to reduce risks associated with pesticides

Malaysian has a comprehensive pesticide risk reduction program implemented by various parties using diverse approaches mainly based on the experience of other countries. Pesticide risk reduction has been actively on the Pesticide Board's agenda for substantial number of years. These are administered by various means such as legislation, administration as well as cooperative efforts between agencies and other related parties. The activities that have taken shape:

- Banning of persistent pesticides
- Register pesticides with safer formulations.
- Restriction on quantities that are allowed to be stored in licensed premises
- Prohibition of sale of Class Ia and Ib pesticides in sundry shops

- Restriction on the sale of *monocrotophos, methamidophos* and acephate
- *Review of registration status*
- *Improvement of information on labels and its presentation*
- *Improvement in pesticide application technology to ensure that pesticides are applied efficiently*
- *Education and training on the safe handling of pesticides*
- *Implementation and promotion of Integrated Pest Management (IPM)*
- *Monitoring of pesticide residue through market sampling*

There is however no training program/projects focusing on risk reduction.

Severely toxic pesticides

Under the Pesticides Act 1974, it is provided that the Pesticides Board may order the cancellation of the registration of a pesticide if the Board considers it undesirable that the pesticide should continue to remain registered owing to its toxicity or inefficacy. The recent concluded decision by the Pesticides Board is the phasing out of *endosulfan* effective 15 August 2005 under the pesticide risk reduction programme due to its extreme toxicity to fish and other aquatic life. All the nine pesticides (viz. *aldrin, dieldrin, DDT, endrin, chlordane, hexachlorobenzene, mirex, toxaphere* and *heptachlor*) currently listed as POPs are no longer used in Malaysia. Other pesticides such as *Folpet*, Sodium PCP, Captafol, Parathion-methyl, azinphos-ethyl and *benomyl* have also been deregistered.

Pesticide disposal

Disposal of pesticides has not ben a significant problem in Malaysia. There is a plant in the country that deals exclusively with toxic wastes disposal and it is an offence to discharge any toxic waste into the environment.

At present, pesticide labels provide guidelines for burying empty pesticide containers as a means of disposal. It is on the agenda that more detailed information such as providing guidelines on the proper method for burying such containers, probably on the minimum acceptable depth of the hole or triple rinsing/crushing of the containers before burying or for recycle for the purpose of turning into pellet should be included.

However, Malaysia has started with a pilot project to recycle pesticide containers in April 2003 in a vegetable growing area involving issuing of discount voucher. Priority is given to the *High Density Poly Ethylene* (HDPE) containers, which have been used in abundance in this region, and rinsed following the triple rinsing method. This project is proven to be quite successful. With that, the recycle programme of pesticide containers was subsequently implemented in 2005 and extended to other vegetables growing areas and crops such as oil palm through the pesticide extension system.

It is also our priority to educate farmers or users to use only pesticide in the amount sufficient for the purpose, not only to save cost and also to prevent any excess of pesticides being released into the environment that could give rise to unnecessary containment in the living surrounding.

Outdated or obsolete pesticides

There is not any significant amount of outdated or obsolete pesticides that pose problem in Malaysia. The remaining stocks of previously registered POPs pesticides as of the end of 1999 mainly DDT, were legally disposed off as scheduled wastes and Malaysia is free from POPs pesticides, i.e. *aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex, toxaphere* and *hexachlorobenzene,* and thereby conforms to the requirements of the Stockholm Convention.

National legislation and enforcement

Pesticides (Registration) rules 1976 were the first rule made under the Act to control registration of pesticides. The objective of registration is to ensure that pesticides imported, manufactured, possessed, sold and used are of good quality, effective for their intended use, and do not cause detrimental effects on human beings, animals, plants, fruits or property.

Under the registration requirements, applicant are required to submit the technical data and information on the pesticide product (technical active ingredient or/and formulation) which are adapted from that specified by the Food and Agricultural Organization (FAO) of the United Nations and also the Malaysian Standards. These include the identity, physical and chemical Properties, the method of analysis, the impact on human and animal (mammalian toxicological data), residue, fate and behaviour in the Environment, the effects on non-target species, and the efficacy data and information.

Along side with the registration process, pesticide label is also being evaluated in accordance to the regulations prescribed under the Pesticides (Labelling) Regulations 1984. Upon fulfilling all the requirements set forth under the registration and labelling requirements, the pesticide will be approved and given the registration number i.e. LRMP/R1/xxxx.

Licensing system for pesticides stores and storage

The Pesticides (Licensing for Sale and Store for Sale) Rules 1988 provide for the issuance of licences to premises involved in the sale and storage for sale of pesticides. Each type of licence is governed by a set of guidelines specific to the type of licence granted for. One of the recently implemented prerequisite for the application of licence is the requirement for all pesticide dealers or sellers to attend the basic sale and storage for sale pesticide course organized by the Pesticides Board. The objectives of this course are to impart knowledge and increase the competency of licence holder on the basic aspect of pesticide management, create awareness and sense of responsibility with regards to the effect of the use of pesticide on human beings, animals, plants, fruits or property, and to assist the licence holder in disseminating correct information related to pesticides to their clients.

Conclusions and comments

Areas of the code that are particularly important in the country

The manufacturing of pesticide has in fact been on the Pesticides Board's top priority agenda. It is anticipated that the new legislation will be implemented in the near future. With the enforcement of this regulation in place, a more comprehensive way of obtaining data or statistic related to quantities of pesticide manufactured, sales and exported can be monitored and controlled. More importantly, the quality of pesticides manufactured and offered for sale can also be monitored.

Problems relating to pesticides that need attention

Some of the important issues that need immediate attention are:

- Adulteration and smuggling of pesticides
- Unapproved use of pesticide or misuse that lead to excessive pesticide residue
- Quality control of pesticide
- Monitoring of pesticides poisoning

Strength and weakness of the present pesticide management system

Strength

- The strong commitment of the government in supporting the regulatory authority
- Availability of the FAO Code of Conduct on the distribution and use of pesticides as guidelines
- Increasing stringent regulatory requirements
- Existence of legal and institutional framework to control and manage pesticides

Weakness

- Political and social challenges
- Lack of resources e.g. expertise, financial and personnel

Major bottlenecks to ensure sound pesticide management

- Environmental (contaminants) and consumer concerns (food safety)
- Pressure from the pesticide Industry for the alleged over-regulation of pesticides

Priority areas for strengthening pesticides management

Major stakeholders include the regulatory authority, industry (pesticide sellers), research institution and user have important roles to play in accelerating the strengthening of pesticides management:

Role of regulatory authority

Legislative control of pesticides will continue to play an important role on the future management of risks of pesticides. Other non-legislative measures, which serve to complement the legislative means, are also important such as developing monitoring system to monitor residues in crops, soil and water; and air.

Role of industry

- Introduce less toxic active ingredient to the market
- Develop safer product such as less hazardous formulation to reduce exposure to workers

- Invest in the stewardship program in ensuring the user awareness of the danger posed by pesticides and pesticides are used effectively and judiciously
- Pesticide sellers to sell only registered product and complies to regulatory system

Role of research institutions

- Conduct more research on PAT to increase efficiency and reduce wastage
- Evaluate suitable materials for protective clothing under hot and humid conditions
- Generate data on Maximum Residue Limits (MRLs) for minor crops.
- Develop more IPM packages
- Test and certify spray equipments
- Develop alternative cultural practices which use less or no pesticide

Role of user

- Use only registered pesticides and consistent with label recommendation
- Adopt IPM strategy and use pesticide when necessary only
- Dispose use containers properly
- Certification of farms with GAP

QUESTIONNAIRE SUMMARY

Malaysia

Selected Country Statistics:

Agricultural Population	**3.9 million**	**Agricultural Land**	**7.5 million ha**
GDP $103 161 million	Agric. GDP: 9.0%	GNI per capita: $3 780	Hunger: 0%
FAOSTAT Pesticide Data	Export $73.1 million	Import: $54.0 million	Use:

GDP = Gross Domestic Product; GNI = Gross National Income; Hunger = Population below minimum energy requirement; FAOSTAT = latest data entry between 1998 and 2002

Institutional Profile

Ministry	**Legislation**	**Registration**	**Licensing**	**Enforcement**	**Testing**	**Training**	**Monitoring**	
							Environm.	**Health**
Agriculture	PCD	PCD	PCD	PCD	MARDI	HRDD		
Environment							Dep. Env.	
Health								Public H.

Industry Associations: Malaysian Crop Care & Public Health Association
Non-Governmental Associations: PAN, Center for Environmental Technologies

A. Pest and Pesticide Management	
IPM policy declared?	**Yes**
IPM mentioned in…	
Crop Protection Policy?	**Yes**
Agric. Sector Policy?	**Yes**
Other laws/documents?	**Yes**
National IPM Program?	**Yes**
Dept:	
IPM extension projects?	**Yes**
IPM research projects?	**Yes**
Pest resistance problems?	--

B. Testing, Quality Control and Effects	
Laws for pesticide specifications?	**Yes**
Low quality products in market?	--
Quality control laboratory?	**Yes**
Own analyses in 2004: **1 649**	
Outside analyses in 2004:	

C. Health and Environmental Information	
Data on pesticide poisoning cases?	**Yes**
occupational exposure cases: **15**	
accidental exposure cases: **53**	
intentional/suicide cases: **74**	
Pesticide poison facilities?	**Yes**
Number of facilities: **1**	
Poison Information and Control Centers?	**Yes**
Number of centers: **1**	
Significant environmental contamination?	--
Data on effects on wildlife & ecosystems?	--
Pesticide residue monitoring system?	**Yes**
Number of analyses 2004: **1 649**	

D. Pesticide Manufacture, Use and Trade		
Pesticide Volume	*Tons*	*$'000 Value*
Imports	**51 000**	
Manufacture		
Exports		
Sales		
Pesticide Use Profile	*Tons*	*$'000 Value*
Agriculture (total)		**85 020**
Insecticides		19%
Fungicides		7%
Herbicides		64%
Other		5%
Veterinary		
Public Health		
Household		
Other		
TOTAL		

E. Selected Standards of Code of Conduct	
Illegal trade estimates?	--
Estimated amount 2004	
Collection of old containers and pesticides?	--
Inventory of outdated/obsolete products?	--
Operational pesticide registration system?	**Yes**
Violations in 2004	
Existing facility licensing system?	**Yes**
Inspections in 2004	
Highly toxic products restricted?	**Yes**

Questionnaire responses: Yes = Yes; -- = No; ? = don't know; (blank) = no answer

MYANMAR

by U. Myo Myint

Introduction

In Myanmar, the Pesticide Law in line with the FAO guidelines has been enacted in 1990. In exercise of the powers conferred under section 50 (a) of the Pesticide Law, the Ministry of Agriculture & Irrigation with the approval of the government, has prescribed the procedures relating to the Pesticide Law, in 1991. The government of the Union of Myanmar, formed the Pesticide Registration Board (PRB) constituted with 10 competent authorities from Ministry of Agriculture, Ministry of Health, Ministry of Forest, Ministry of Livestock Breeding & Veterinary and Ministry of Trade, in 1992.

The first meeting of PRB was held in 1992 and so far 13 PRB meetings have been convened with the support of the Technical Committee, formed with technical personals of the relevant ministries. The office of the PRB was opened at the Plant Protection Division of Myanmar Agriculture Service the premise where the secretary of PRB and most of technical members attend their offices.

The management and control activities being carried out by the PRB are as follow:

(1) Registration of pesticides

The registration of pesticides is considered on product basis. According to the Law the pesticides to be used in the country or to be exported must have one of the following registration or use permit.

(a) Experimental registration

(b) Provisional registration

(c) Full registration

(d) Special use permit

Experimental registration is meant to pesticides those require detail observation before permitting a provisional registration, and only allowed for specified application on a limited area for a maximum period of two years.

The pesticides which have been using in the country, from the time of Law enactment and measured to be acceptable in bio-efficacy and toxicology aspects could have Provisional Registration and reach a marketable stage. More practical and detail evaluation undergo being the 5 year period of provisional registration.

Full registration is to be permitted for 10 year after provisional periods studies are satisfactory.

Special use permit is issued for emergency use considered inevitable for the control and prevention of unanticipated pest incidence.

Amendment of registration means alteration of the original registration for any of the followings with respect to the registered pesticides:

- change of formulation
- expanding the field of application
- formulation and production under a new name by a third person using the active ingredient contained in a pesticide registered by a manufacturer with the consent of the manufacturer

Until the year 2004, products have been scrutinized for their efficacy, toxicity, quality and other necessary parameters and granted the registration type mentioned below.

Type of registration	No. of product
Experimental registration	101
Provisional registration	582
Amended	50
	733
Full registration	28 (from provisional)
Total	761

A. Pest and pesticide management

IPM for sustainable agriculture

To support sustainable development in agriculture control method compatible to IPM strategy has been emphasized among other plant protection measures. The pesticide should be used judiciously as a last resort in IPM strategy. Many IPM supporting activities are being carried out by PPD, MAS and listed below.

Biological control measures

The development of Integrated Pest Management (IPM) practice with strong emphasis on biological control works as a part of Integrated Pest Management program is being carried out for the following pests and diseases:

Name of Beneficial Organism	Target Pest
Green Lacewing *Chrysoptera spp.*	Aphids, mealy bugs
Eocanthecona farcellata	American Bollworm *Helicoverpa armigera* on Cotton
Campoletis chlordiae	American Bollworm *Helicoverpa armigera* on Cotton
Metarhizium anisopliae	Cabbage Heart caterpillar (Helulla spp.) on cabbage
Trichoderma (fungus)	for control of phytophtora disease in Durian.
Use of Biological Pesticides	
Neem pesticides	(Azadirachtin)
B.T	(Bacillus thurengiensis)

B. Testing, quality control and effects in the field

Quality control

Parameters examined

- safety of packaging
- a.i. content
- emulsion stability/suspension stability
- wet sieve test/dry sieve test
- pH
- storage stability

The quality control programme carried out by the Pesticide Analytical Laboratory, PPD, MAS, indicated that number of products in line with FAO specification has significantly increased since the enforcement of the Law. On the other hand, only illegal products coming in through border areas remain to be controlled.

Year	No. of samples Analyzed	Samples in line with required specification	% qualified
1996-97	115	111	96.5
1997-98	148	144	97.3
1998-99	209	175	83.7
1999-2000	122	110	90.2
2000-2001	231	202	87.4
2001-2002	129	100	77.5
2002-2003	67	58	86.6
2003-2004	195	193	98.0
2004-2005	108	100	92.0

C. Health and environmental information

In 2003 general survey was conducted in 16 states and divisions hospitals. The data of the collection on poisoning status of the hospitalized cases is as follows.

Distribution of the Acute Pesticide Poisoning Cases by Type in 2003

Type	ICD 10 Code No.	Cases	Death
Organophosphates	X 68	216	23
Cypermethrin (Pyrethroid)	X 68	9	2
Insecticide (unsp)	X 68	89	9
Rodenticide (unsp)	X 68	82	6
Pesticide (unsp)	X 68	9	3
Herbicide (unsp)	X 68	3	–
Endosulfan (Organochlorine)	X 68	3	–
Carbamate (unsp)	X 68	1	–
Metadelphene (Repito)	X 68	1	–
Total		413	43
% OP		52.3	53.5

Distribution of the Acute Organophosphorus Pesticide Poisoning Cases by Category in 2003

Type	ICD 10 Code No.	Cases	Death
Malathion	X 68	132	12
Fenitrothion	X 68	4	1
Monocrptophos	X 68	2	–
Organophosphorous (Unsp)	X 68	78	10
Total		216	23
% Malathion		61	52

Where “Unsp” stands for unspecified poisoning

Plant Protection Division, Pesticide Analytical Laboratory (PAL) is monitoring the Maximum Residue Limits (MRL) in marketing crops; cabbage, tomato and pulses. National Food Law was enacted in 1997 and also monitoring for food safety and standardization has just started under the Ministry of Health.

Residues survey in food commodities and violation of MRL’s (1989-2005)

Year	No. of sample Analyzed (Food)	Sample violating Codex Limits %	Detected Residue Level	
1989-90	190	44 (23%)	∑ DDT Aldrin + Dieldrin	0.3-0.4 0.1-0.2
1990-91	244	45 (18%)	∑ DDT Aldrin + Dieldrin	0.2-1.0 0.2-1.3
1991-92	51	0	0	
1992-93	49	3 (6%)	∑ DDT Aldrin + Dieldrin	0.03-0.2 0.01-0.06
1993-94	115	15 (13%)	∑ DDT Aldrin + Dieldrin	0.01-0.05 0.01-0.05
1994-95	44	7 (16%)	∑ DDT Aldrin + Dieldrin	0.15-0.2 0.01-0.02
1995-96	60	0	0	
1996-97	40	2 (5%)	∑ DDT Aldrin + Dieldrin	0.05 0.03
1997-98	36	0	OCI detected < LD	
1998-99	159	0	OCI detected < LD	
1999-2000	66	0	0	
2000-2001	83	0	0	
2001-2002	81	0	0	
2002-2003	27	0	0	
2003-2004	49	0	0	
2004-2005	46	0	0	

* LD = Limit of detection

D. Trends in pesticide manufacture, use and trade

Pesticide production

There are three pesticide formulation plants in Myanmar. Two are neem formulation plants in Paleik and Pakokku another one is pilot pesticide formulation plant in Hmawbi established by UNIDO Aid in 1990. Registered technical grades are imported and formulated in that plant.

Pesticide Formulation in Hmawbi Pesticide Formulation Plant

No.	Name of Insecticide	1995-96	1996-97	1997-98	1998-99	1999-2000
1	Fenitrothion 50% EC	110 150	101 812	16 930	130 000	155 000
2	Phenthoate 50% EC	40 182	90 011	87 620	100 000	95 000
3	Endosulfan 35% EC	39 155	51 470	52 720	100 000	105 000
4	Cypermethrin10% EC	138 458	82 135	54 040	150 000	150 000
5	Diazinon 40% EC	71 992	80 485	58 780	100 000	150 000
6	Deltamethrin 2.5% EC		20 560			10 000
7	Permethrin 20% EC		14 400			
8	Sumialpha 5% EC		55 210	47 210	50 000	35 000
9	Malthion 50% EC				70 000	
	Total	399 937	496 083	281 300	700 000	700 000

quantities in actual liter

After year 2000, pesticide production stopped due to mechanical failure.

Neem Pesticide Production in Myanmar

No.	Year	Production of formulation (Liter) 0.75% SC (Suspension Concentrate)
1	1994-95	6 189
2	1995-96	11 745
3	1996-97	15 931
4	1997-98	11 647
5	1998-99	16 000
6	1999-2000	24 000
7	2000-2001	47 301
8	2001-2002	26 344
9	2002-2003	3 766
10	2003-2004	7 808

The import of pesticides is shown in the following table:

Pesticide import to Myanmar during (1992-93 to 2003-2004)

Year	Types of Pesticides	Government Sector		Private Sector		Total Metric Ton
		Metric Ton	Yearly Total	Metric Ton	Yearly Total	
1992-93	Insecticide	327.03	346.47	–	–	346.47
	Fungicide	6.59				
	Herbicide	9.78				
	Fumigant	–				
	Other	3.07				
1993-94	Insecticide	420.63	458.83	0.04	2.52	461.35
	Fungicide	21.38		–		
	Herbicide	13.77		–		
	Fumigant	–		2.48		
	Other	3.05		–		
1994-95	Insecticide	584.26	645	12	76	721
	Fungicide	29.33		–		
	Herbicide	11.39		–		
	Fumigant	–		64		
	Other	20.02		–		
1995-96	Insecticide	794.42	837	21.60	55.20	892.20
	Fungicide	26.58		8.20		
	Herbicide	6.25		9.40		
	Fumigant	–		16.00		
	Other	9.75		–		
1996-97	Insecticide	469.48	542	462.67	554.45	1 096.45
	Fungicide	10.77		10.78		
	Herbicide	28.51		28.50		
	Fumigant	–		52.50		
	Other	33.24		–		
1997-98	Insecticide	536.26	591	290.98	394.86	985.86
	Fungicide	6.08		81.00		
	Herbicide	25.66		22.88		
	Fumigant	15.00				
	Other	8.00				
1998-99	Insecticide	482.91	482.91	1 827.42	1 924.46	2 407.37
	Fungicide			95.04		
	Herbicide			2.00		
	Fumigant					
1999-2000	Insecticide	146.96	146.96	2 597.75	2 980.59	3 127.55
	Fungicide	–		262.12		
	Herbicide	–		120.72		
2000-2001	Insecticide	850	880	1 350.11	1 845.35	2 725.35
	Fungicide	30		213.90		
	Herbicide			157.00		
	Fumigant			32.00		
	Rodenticide			10.00		
	Other			82.34		
2001-2002	Insecticide	316.475	316.457	1 851.12	2 690.14	3 006.615
	Fungicide			427.90		
	Herbicide			152.00		
	Fumigant			15.22		
	Rodenticide			20.00		
	PGR			160.75		
	Other			63.15		

Year	Types of Pesticides	Government Sector		Private Sector		Total Metric Ton
		Metric Ton	Yearly Total	Metric Ton	Yearly Total	
2002-2003	Insecticide Fungicide Herbicide Fumigant Rodenticide PGR Other	257.229	257.229	1 668.09 544.00 120.00 79.08 – 145.10 62.20	2 617.47	2 874.699
2003-2004	Insecticides Fungicides Herbicides Other (PGR and fumigant)			2 004.10 633.45 142.57 250.00	3 030.12	3 030.12

Data of pesticide consumption in Myanmar points out that the pesticide consumption is very low compared to many neighbouring countries. The agriculture use contributes to 90 percent of total amount.

Many years ago, OC pesticides such as aldrin, endrin, BHC (especially r BHC, Lindane) DDT were used for agriculture and public health and now there are plans to ban endosulfan, the last organo-chlorine compound being used in Myanmar.

E. Selected standards

Hazard classification of pesticides to be allowed for registration in Myanmar based on the WHO recommended guide lines. (1993-2004)

Sr. No.	Pesticide	WHO Toxicity Class					Total
		Ia	Ib	II	III	IV	
1	Insecticide	–	27	128	77	14	246
2	Insecticide TG	–	3	49	5	3	60
3	Insecticide/Acaricide	–	9	31	13	–	53
4	Acaricide	–	–	–	2	–	2
5	Rodenticide	7	2	–	2	–	11
6	Herbicide	–	2	17	53	45	117
7	Fungicide	–	–	12	43	49	104
8	Fungicide/Bactericide	–	–	–	2	–	2
9	Insecticide/Fungicide	–	–	1	1	–	2
10	Insecticide/Nematicide	–	2	12	3	–	17
11	Insecticide/Molluscicide	–	–	–	1	–	1
12	Bio-insecticide	–	–	–	–	3	3
13	Stored Pest Control	8	1	–	–	–	9
14	Public Health	–	–	11	22	63	96
15	Plant Growth Regulator	–	–	–	3	7	10
	Total	15	46	260	227	185	733

Licenses under the legislation

Type	No.	Controlled by
Formulation Licence	46	Chairman of PRB
Repacking Licence	–	not allowed by PRB
Fumigation Licence	25	by PRB
Retailers Licence	1 655	Township Manager

Certified Pesticide Applicator Training (1993 to date)

State/Div	No. of Times	Trainees (Private + Government)
Yangon	12	837
Mandalay	13	945
Sagaing	5	384
Bago	11	719
Magwe	5	323
Shan	6	310
Ayeyarwady	7	545
Mon + other	2	95
Total	61	4 158

Existing laws relating to control of toxic chemicals

1. The Government of Myanmar has enacted the Pesticide Law in 1990. The Law monitors and controls the selection, storage, transportation and use of pesticides to protect people, crops, other biological entities and the environment.
2. The Factories Act 1951 controls factories involved with chemical, particularly hazardous or toxic chemicals.
3. The Union of Myanmar Public Health Law, 1972 also controls the toxic substances used as consumer products and some purposes for human health.
4. The National Food Law, 1997 controls the food safety and food quality to protect consumers' health. (Food and Drug Administration, Ministry of Health)

In line with the Stockholm Convention, Myanmar has banned 9 pesticides out of 12 POPs.

Existing national legislation on POPs (Pesticides) in Myanmar

No.	Pesticide	Category	National Legislations	Stockpile
1	Aldrin	I	bans for all use	nil
2	Chlordane	I	not used; no registration	no use
3	Diedrin	I	bans for all use	nil
4	DDT	I	restricted to malaria control	25% EC 169 litres 75% WP 523 kg
5	Endrin	I	bans for all use	nil
6	HCB	F	not used, no registration	no use
7	Heptachlor	I	not used, no registration	no use
8	Mirex	I	not used, no registration	no use
9	Toxaphene	I	ban for all use	no use

Myanmar is having access to the Rotterdam Convention to implement PIC procedure. Director General of Department of Agricultural Planning was designated as DNA but Plant Protection Division is carrying out notification of final regulatory action and importing country response.

Status of control management for 26 pesticides subject to PIC list in Myanmar is as below.

List of Restricted Pesticides

(by notification no: 1/94 of Pesticide Registration Board, 23rd March 1994)

No.	Pesticide	Remarks
1	Methyl Bromide	Fumigant to be handled only by CPA holders.
2	Phosphine	Fumigant to be handled only by CPA holders.
3	Bromadiolone	Rodenticide a.i. to be handled only by certified formulator.
4	Zinc Phosphide	Rodenticide a.i. to be handled only by certified formulator
5	Brodifacoum	Rodenticide a.i. to be handled only by certified formulator
6	Fenthion	Restricted to vector control.
7	DDT	Restricted to vector control for malaria.

List of Banned Pesticides in Myanmar

(by notification no: 1/96 of Pesticide Registration Board, 1st August 1996)

No.	Pesticides	Group	
1	Aldrin	Organochlorine	POPs
2	BHC	Organochlorine	PIC list
3	Captafol	Phthalimide	PIC list
4	Chlordane	Organochlorine	POPs
5	Chlordimeform	Formamidine	No use in the country
6	Cyhexatin	Organotin	No use in the country
7	Dieldrin	Organochlorine	POPs
8	EDB (Ethylene Dibromide)	Fumigant	Very highly toxic
9	Endrin	Organochlorine	POPs
10	EPN	Organophosphorus	Very highly toxic
11	Inorganic mercury compound	Inorganic	PIC list
12	Organic mercury compound	Organic	PIC list
13	Parathion ethyl	Organophosphorus	Very highly toxic
14	Strobane		Obsolete
15	2, 4, 5-T	Phenoxy herbicide	PIC list
16	Toxaphene	Organochlorine	POPs
17	Dinoseb	Dinitrophenol	Reproductive effect
18	Monocrotophos	Organophosphorus	very highly toxic
19	Methamidiphos	Organophosphorus	very highly toxic

Conclusions and comments

In Myanmar, being an agriculture country, it is deemed that pesticides cannot be abandoned for agriculture production for a foreseeable future. IPM packages by crops have been developed in cotton, rice, pulses and some vegetable with strong emphasis on less use of pesticides.

On the other hand, pesticide can cause not only human health and environmental problem but also can have negative impact on the economy of an agriculture exporting country (e.g. trade interception due to legal limits of pesticides content in food).

Though the acute poisoning of these chemicals are fairly observed, the chronic aspect seems to be less knowledge and current awareness service is urgent needed for both producers and consumers in food safety aspect.

PRB of Myanmar recognizes the depth and wideness of the scope of pesticide management and calls for better co-operation with farmers for the sound and effective use of pesticides for clean and green agriculture.

QUESTIONNAIRE SUMMARY

Myanmar

Selected Country Statistics:

Agricultural Population	**34.0 million**	**Agricultural Land**	**10.6 million ha**
GDP $	Agric. GDP: 57.2%	GNI per capita: $	Hunger: 6%
FAOSTAT Pesticide Data	Export	Import: $11.5 million	Use:

GDP = Gross Domestic Product; GNI = Gross National Income; Hunger = Population below minimum energy requirement; FAOSTAT = latest data entry between 1998 and 2002

Institutional Profile

Ministry	**Legislation**	**Registration**	**Licensing**	**Enforcement**	**Testing**	**Training**	**Monitoring**	
							Environm.	**Health**
Agriculture	MAS	PPD	PPD	PPD	PPD		PPD	PPD
Environment								
Health			OHD, City		FDA			

Industry Associations:
Non-Governmental Associations: –

A. Pest and Pesticide Management

IPM policy declared?	--
IPM mentioned in…	
Crop Protection Policy?	**Yes**
Agric. Sector Policy?	--
Other laws/documents?	**?**
National IPM Program?	**Yes**
Dept: **PPD**	
IPM extension projects?	**Yes**
IPM research projects?	**?**
Pest resistance problems?	**?**

B. Testing, Quality Control and Effects

Laws for pesticide specifications?	**Yes**
Low quality products in market?	**Yes**
Quality control laboratory?	**Yes**
Own analyses in 2004: **150**	
Outside analyses in 2004:	

C. Health and Environmental Information

Data on pesticide poisoning cases?	**Yes**
Total cases (2004): **413**	
occupational exposure cases:	
accidental exposure cases:	
intentional/suicide cases:	
Pesticide poison facilities?	**Yes**
Number of facilities: **1**	
Poison Information and Control Centers?	**Yes**
Number of centers: **1**	
Significant environmental contamination?	**?**
Data on effects on wildlife & ecosystems?	**?**
Pesticide residue monitoring system?	**Yes**
Number of analyses 2004: **80**	

D. Pesticide Manufacture, Use and Trade

Pesticide Volume	*Tons*	*$'000 Value*
Imports	**3 030**	
Manufacture		
Exports		
Sales		
	(formulated?)	
Pesticide Use Profile	*Tons*	*$'000 Value*
Agriculture (total)	**3 019**	
Insecticides	66%	
Fungicides	21%	
Herbicides	5%	
Other	8%	
Veterinary		
Public Health		
Household	**12**	
Other		
TOTAL	**3 030**	

E. Selected Standards of Code of Conduct

Illegal trade estimates?	--
Estimated amount 2004	
Collection of old containers and pesticides?	--
Inventory of outdated/obsolete products?	--
Operational pesticide registration system?	**Yes**
Violations in 2004: ?	
Existing facility licensing system?	**Yes**
Inspections in 2004: ?	
Highly toxic products restricted?	**Yes**

Questionnaire responses: Yes = Yes; -- = No; ? = don't know; (blank) = no answer

NEPAL

by Bhakta R. Palikhe

PESTICIDE MANAGEMENT IN NEPAL: In view of Code of Conduct

Abstract

All pesticides must be registered before they are manufactured, formulated, distributed, sold, put on the market or delivered, and also before they are packed. International Code of Conduct on the distribution and use of pesticides points out the objectives are to set forth responsibilities and establish voluntary standards of conduct for all public and private entities engaged in or affecting the distribution and use of pesticides, particularly where there is no or an inadequate national law to regulate pesticides In Nepal problems include pollution generated during improper handling, storage, transport and accidents and environmental contamination due to unsound disposal methods, the majority of such problem is usually associated with the use and misuse of pesticides in the agricultural sector. Pesticide use in Nepal is however a dynamic situation and new challenges are always there to be met. Pest resistance to chemical pesticide is major problem in Nepal as well and is increasing. Like many developing countries, analysis of pesticide residue in crops food products, soil and water and the environmental effects of pesticides have not been systematically studied and monitored in Nepal. There is on going need for farmer education and development of safety culture in pesticide use and introduction of safer and more specific pesticides as well as development and use of bio-pesticides must be considered as a concurrent rational approach. The Government felt the need to have an institution totally devoted for propagating the philosophy and use of Integrated Pest Management in agriculture. Many individual accidental cases arrive at hospital or health care centers/facilities with varying degree of severity. Government confronts numerous constraints in terms of a lack of qualified and trained personnel and technical capacities in pesticide management. These areas need to be substantially strengthened for the government to be able to undertake its mandate to implement effective regulation of the production, importation, distribution and safe use of pesticides. Overall, efficiency improvements in pesticide management are extremely important, given that pesticide use has been steadily increasing annually. Pesticide exporting countries are obligated under the provisions of code of conduct to follow guidelines, standards and recommendations for pesticide management.

Introduction

Nepal is predominantly an agricultural country. The economic scenario of Nepal is dominated primarily by the agriculture sector. In Nepal the diverse agro-climatic conditions necessitate different approaches to cultivation and crop protection; crop losses during post-harvest phase are quite high.

Nepal passed the first Pesticide Act in 1991, which is considerably later than other South Asian countries (SAC). The purpose of legislation on the formulation, importation and use of pesticides is to enable the society to obtain the benefits from their use with minimal adverse effects to humans and other non-target organisms.

The Pesticide Rules were approved in January 1993. The Act and the Rules were gathered to become operative on 16 July 1994. The Act regulates the import, manufacture, sales, distribution and

use of pesticides within the country with a view to prevent risks of human beings, animals and foe matters connected herewith. The Act established a Pesticide Registration and Management Division. It also established a Pesticide Committee which composed of members from various ministries, the Pesticide Association of Nepal, scientists and consumer groups for the purpose of discussing pesticide related issues and define its functions, duties and powers.

The Committee is mandated to:

- Advise HMG/N in the formulation of national policy regarding pesticides.
- Maintain co-ordination between private and government sectors in the production and distribution of pesticides.
- Encourage private sector investment in the pesticide industry.
- Regularize or control the quality of pesticides produced by the industry operated under private or government sectors and
- Set standards for pesticide quality.

The system for regulation, control and management was established by a series of import certificates (for 5 years with provisional or conditional) and reseller licenses (for 2 years) issued by the registration agency. Registration is required for each formulation and brand of pesticides.

The Act also manages the Pesticide Inspectors (PIs) who represent the enforcement arm of the government in 75 districts to monitor pesticide sales, storage, quality, use and disposal. The duties of PIs will be to inspect the premises of each reseller, wholesaler, importers and formulators. Also, part of their duties is to advise the farmers on safe use practices of pesticides.

A. Pest and pesticide management

The Plant Protection Directorate (PPD) of Department of Agriculture (DOA) undertakes general pest control methods and new programs on pest control management such as IPM. The major emphasis at present is on IPM approaches in major cereals, cash crops and vegetables. The Tenth Five-year Plan officially recognized the need for IPM, which has been declared as a national pest control strategy. The Agricultural Perspective Plan (1997-2017) has also highlighted on the need for IPM and has emphasized in the rapid dissemination of its techniques among the farmers as a primary plant protection measure. In Nepal, APP has duly recognized IPM as one of the priority agenda for sustainable agriculture. There is also to fulfill the commitments made in Earth Summit held in Rio, Brazil in 1991. Realizing its potentiality, PPD/DOA have already given priority to create public awareness and started implementing effective IPM programs through IPM Farmer Field Schools (FFS) for proper, sound and judicious management of pesticides and control of hazardous chemical pesticides.

The potentiality of IPM practices lie in its sustainability in terms of social, economical and ecological attributes. The program is being gradually replicated in other crops such as vegetables, fruits and potato. However there is a need to develop a comprehensive policy and program whereby both GOs and NGOs can join hands with farmers to expand the program.

The Government of the Kingdom of Norway in 2003 had donated a grant to HMG/NEPAL to provide “Support to the National Integrated Pest Management (IPM)” Program in Nepal in co-operation with FAO technical assistance from December 2003 to December 2007 realize the following objective.

Objective

- To contribute to sustainable broad-based poverty alleviation and food security while contributing to environmental protection.

In practice, several other models exit and have been advocated; the main ones being Integrated Crop Management (ICP) which emphasize judicious as opposed to indiscriminate use of pesticides, Low External Input Sustainable Agriculture (LEISA), and Organic Agriculture (OA). The another pesticide management is that if products contravene any provision of law under which they are registered, the marketing company is subject to penalties, including the cancellation of registration.

Integrating HIV/AIDS in FFS approach

Care-Nepal is conceptualizing the implementation of an intra-sector model within the FFS program. In this regard, Care-Nepal has prepared a concept note on "Integrating HIV/AIDS in FFS. What has been suggested is that there can only be poverty reduction if health issues are seriously considered amongst the community. Therefore, integrating HIV/AIDS in FFS could be another option to improving the livelihood and ensure the safe health of individual household as well as to contribute to the minimization of national poverty.

Constraints to IPM: Misuse/overuse of pesticides

- Strengthen NGO/GO collaboration*
- Gender sensitivity
- Dealers take up insensitive and aggressive marketing strategies to sell their products
- Sales promotion activities of pesticides
- False advertisement/control of advertisements. No misleading statements or over claims on safety or efficacy of a product or unlawful to advertise false, deceptive information and not to claim that any pesticide is safe, non-poisonous, non-injurious or harmless
- The 3R's problem:
  - Resistance
  - Release secondary pests outbreaks
  - Resurgence (rising again) primary pests
- Illegal trans-boundary movement
- Unaware of PIC, POPs and PTS chemicals

Solution to the problem

- Farmers resort to easily available alternatives
- The utmost need is farmers education and technological development to adopt IPM
- Capacity building and public awareness on issues relating to pesticide use
- Promotion of IPM and IVM
- Truth in advertising
- Stronger enforcement

B. Testing, quality control and effects in the field

Once registered and permitted for formulation and sale, the product is subjected to an important regulatory requirement: monitoring for quality. Pesticide Inspectors are empowered and responsible for enquiry, examination, drawing of samples, detention and seizure of suspected stocks, and launching of prosecutions against offenders. Dealers distribute pesticides in small prepackaged and labeled containers to end users throughout the country. Random samples of all these products are collected from the dealers shop. Action is taken against the dealers if test reports show the product to be defective. If the product does not conform to approved specifications, the following actions are taken:

- The imported product is not released for marketing and sale.
- If the samples collected from the dealer's shop show the product to be defective, suppliers are advised to withdraw from the market.

C. Health and environment information

Systematic studies are lacking to monitor the effects of pesticides on human health and the environment. So there are serious data gaps observed due to lack of capability and capacity in monitoring data relating to health, environmental contamination and specific incidents. However, there is little information on environmental contamination, poisoning cases and the presence of several pesticides in crop and vegetables.

Though, environmental levels of pesticides were not reported but a survey conducted in 1995 in Nepal revealed that chemical pesticides such as aldrin were used for fishing baits in rivers, streams and ponds. These chemicals kill the fish, which after surfacing are collected by fisherman. Fisherman even place pesticides (Endosulfan) into rivers, and streams in order to catch fish in an easy way. A study on pesticide pollution in Nepal revealed that 52 percent of the respondents had no knowledge of the environmental effects of chemical pesticides.

Although the developed countries consume more pesticides, the pesticide poisoning cases are observed more in developing countries. Excessive use of pesticides, lack of education and the discomfort of using protective clothing increase poisoning risks in agricultural workers, but the country has no regular system of data collection on poisoning cases, and there is no regular program for monitoring the health of the workers involved in handling the pesticides. In Nepal, the pesticide residue limits are set by the food standardization committee (FSC).

In a recent study carried out by Plant Protection Directorate eighteen samples of vegetables collected in 2004 and these samples (7 samples of potato, 6 samples of brinjal, and 5 samples of tomato) were analyzed at the private accredited laboratory. The residue level in potato was recorded from 0.45 to 4.8 ppm (Mancozeb), N.D (Endosulfan), 0.017 ppm (Methyl Parathion). Likewise, the residue level in tomato was found from 1.48 to 8.6 ppm (Mancozeb), N.D to 0.042 ppm (Cypermethrin) and N.D (Dimethoate). Samples of brinjal were not found to be contaminated with pesticide residue (Deltamethrin, Fenvalerate, Cypermethrin, Chlorpyrifos and Methyl Parathion).

The Department of Food Technology and Quality Control also collected 106 samples of different food commodities in 2001/2002 and the samples were analyzed for the estimation of Organochlorine (DDT and BHC) and Organo-phosphorous (Parathion, Methyl-parathion and Malathion) pesticides. The results revealed that samples of different food commodities were not found to be contaminated with pesticide residue. There is a system to monitor pesticide residues and

the Department of Food Technology and Quality Control is responsible for monitoring food safety in Nepal.

Pesticide poisoning is a major public health problem in the developing countries. Although some hospital based data are available but there are no large scale or nation wide study done on the scale of poisoning problem in Nepal. For proper evaluation of poisoning pattern, an extensive study has to be conducted in different specialty care, regional, zonal, district hospitals as well as primary care center, health post and sub-health posts so that intervention programs like poison prevention, mental health awareness and restriction on the sale and use of toxic pesticides can be implemented.

In Nepal, even though there are general and specialized hospitals, majority of cases are handled in peripheral levels of health care units such as health Post and District Hospital. Treatment of poisoning cases is based on individual case. However, there are no standard protocols for handling such cases immediately after arriving in the emergency ward. Therefore a concrete plan and program to safe guard the health of the public has become mandatory in the area of toxicology. Establishment of Nepal Poison Information Center (NPIC) is a positive step towards this direction. It has been providing tailor made management information to health care professional and preventive information to general public.

During 2002, the Nepal Drug and Information Center answered 3 012 incoming calls that consisted of 2 083 human exposures, 18 animal exposures 876 non exposure poison or drug information and 35 medical information.

80 percent (1 658) and 20 percent (412) calls were from hospitals and general public respectively. 4.27 percent (89) deaths among 2 083 calls and aluminium phosphide followed by organophophates were the most commonly involved in those deaths. Over 65 percent (1 368), 31 percent (660) and 0.72 percent (15) calls were concerning suicidal, accidental and occupational patients, respectively. Over 54 percent (1 141) cases involved agricultural agents followed by drugs (23 percent), household agents (15 percent), plants (4 percent), and bites/sting (2 percent). Among the agricultural agents, insecticide lead the cases, 61 percent (694) followed by rodenticide, 27 percent (312) (Source: The Nepal Drug and Poison Information Centre-2002 Sixth Annual Report.).

D. Trends in pesticide use and trade

Most pesticides used in Nepal are imported from India, some from China and other countries on the basis of a registration. Distribution of pesticide in Nepal is conducted only in the form of finished products. Nepal is included under the category of LDC which has limited use of pesticide per capita and/or ha. So, in comparison to other countries in the Asia Pacific Region, the use of chemical pesticides in Nepal is one of the lowest. Pesticide use, however, is much more intensive in areas that have greater access to markets. The use is higher in areas with intensive commercial farming of vegetables, fruits, tea, rice and cotton. Under the present scenario, as reported by many, judicious and prudent use of pesticide by the Nepalese farmers is largely disregarded. All types of pesticides are not only repeatedly but also carelessly used.

There are approximately 38 importers. Some 3 450 resellers received training on safe use of pesticides and storage management of which 2 543 were licensed. About 319 types of pesticides by trade name (Insecticides-213, Fungicides-71, Herbicides-23, Rodenticides-8, Acaricides-2 and others-2) have been registered for use under Pesticides Act and Rules. Highly persistent types (POP pesticides), Phosphamidon and Organo-mercury fungicides are banned in Nepal (PR and MD 2004 Annual Report).

According to the latest estimate the annual imports of pesticides is about 177 tons (a.i.) and current annual use is more than 142 tons (a.i.) with 48.3 percent as insecticides, 46.2 percent fungicide, 4.4 percent Herbicide, 1.1 percent others. The gross sales and valued as $2.1 million per year (PR and MD, 2004 – Annual Report).

As there is an open and porous border with India, there is a considerable, but unknown quantity of trade between farmers close to the border. Illicit/illegal import, smuggled pesticides and trans-boundary issues are of serious concern to Nepal which needs to be addressed in multilateral approach with neighboring industrialized countries in prevention of potential infiltration of banned/unregistered pesticides.

E. Selected standards

Government policies and programs on pesticide

There is a regulatory infrastructure established for the management of pesticides in Nepal. It covers all handling and use aspects of pesticides. The importers wishing to market and sell pesticides must submit an application dealing with the use of pesticides, toxicity and the correct use of pesticides in agriculture and health sector from the health point of view. No pesticide may be imported into the country without the appropriate certificate of importation issued by Registration Authority.

Large persistent chemical pesticides have been banned for agriculture and public health from 9th April, 2001 and also hazardous pesticides have been phased out from the use since 9th April, 2001. At present, prohibition on the use of Quinalphos, Ethion, Monocrotophos and Phorate in the tea field is being campaigned and implemented from 9th, May, 2005 because these pesticides are highly toxic. The pesticides to be imported, distributed, traded and used should be more friendly and less hazardous to health and environment More emphasis has been given to use organic pesticides as an alternative of chemical pesticides to control crop pests. Development and use of some microbial and botanical pesticides which are eco-friendly has opened a new field of bio-pesticides. The best know form of bio-pesticide is the Bacillus thuringensis (Bt). Eco-friendly neem formulations are also being used currently. IPM has been widely accepted as the alternative to pesticide application. The significant being phasing out of an environmental unfriendly pesticides are rigorous approval of the newer and more safer and specific molecules. Government has already conducted or is regularly lunching training programs to educate the concerned personnel.

In Nepal, as in most of the other developing countries in the region, the capabilities, expertise and resources to fully implement the regulation are limited. Further, there is a need to strengthen the scientific and technical base for health and environmental risk assessment.

HMG/N is also reviewing to phase out PIC listed two pesticides: Methyl parathion and Monocrotophos. The Government would review, revise and as needed, develop legislation and supporting regulations which promote chemical safety in the home, the workplace and other areas of the environment as well as in relation to food and also develop measures to prevent illegal Tran boundary movement of chemicals.

Pesticide stockpiles

The safe disposal of unwanted time-expired and/or damaged pesticides and empty containers is a problem in Nepal as the facilities and the technical know how to accomplish disposal are limited. The problem of obsolete pesticide remains serious and urgent. About 75 tons of obsolete pesticides are stored in warehouses of different locations.

HMG/Nepal is executing a project entitled Enabling activities to facilitate early action on the implementation of the Stockholm Convention on Persistent Organic Pollutants (Pops). The objective of the project is to assist HMG/N to meet its obligations of the Stockholm Convention and endorse its National Implementation Plan (NIP) on Pops. And also to strengthen national capacity and enhance knowledge and understanding amongst decision makers, managers, NGOs and the public at large on Pops to develop and formulate a NIP.

Present priorities

- Alternate chemicals/alternative technologies

  Awareness of the alternate chemicals and the need to replace the environmentally unfriendly chemicals is being realized. The financial constraints, lack of R and D infrastructures don't permit development and use of alternate chemicals. Priority should be given by the international agencies to develop alternate chemicals/alternative technologies through research and other means of support where necessary.

- Monitoring capacity

  It is necessary to address both technical and administrative aspects for monitoring capacity. Two aspects are inter-related and they should be taken individually so that the strengths and weaknesses in the region and local levels could be easily understood.

- Environment-International Agreements

  Nepal needs to ratify/sign the Environment-International Agreements and conventions.

- Identification of needs at local level

  Establishment of a national focal point to co-ordinate all the relevant agencies or an authority responsible for the pesticides related issues. There should be a multi-disciplinary approach.

- Stockpile of obsolete pesticides

  Special attention is drawn to the stockpile of obsolete chemicals in Nepal and necessary actions have to be adopted in preventing potential threats to the environment and safe disposal.

- Filling of Pesticide Exposure Records (PERs)

  Filling of PERs needs improvement. More training and interaction is needed with medical and paramedical staffs responsible for reporting poisoning.

Data gaps:

- Limited data on environmental levels are available.
- No apparently monitoring system due to non-availability of infrastructures and relevant technical manpower.
- No organized national surveys repeatedly conducted.
- A valid comparison of data cannot be made.

Conclusion and recommendations

One of the primary objectives for managing and controlling pesticides is to ensure that the product is effective for the control of the target pest while causing little or no deleterious effect to man, non-target organisms and the environment as a whole. Like the other regions, this region has been using many environment unfriendly chemicals and processes, which has led to the pesticide problem. Government policies still favor pesticides and high subsidies exist, while newer IPM products are taxed at high rates. The government should foster IPM by removing subsidies on the least desirable pesticides while removing taxes from IPM products. These economic incentives would go a long way in changing the practices of farmers. This recommendation is in line with recent changes in government policy where IPM methods are to be preferred over pesticide usage. Pesticides should only be supplied that meet international standards of quality and are packaged and labeled as appropriate in the line of code of conduct that is adequate for farmers to ensure safe and effective use Alternatives should be safe and effective and new technologies should be provided at affordable cost. People of LDC countries need to encourage and promote the development of indigenous technology and traditional method of the plant diseases, insect pest control and vector borne diseases control at national and regional level. Keeping in view the problem of residue of pesticides in different components including food items, the Government should educate and advocate an IPM and the methods don't go for demonstration only but validation on large scale. Effective registration, licensing, quality control, food residue analysis and other enforcement measures including monitoring and testing will be needed. In Nepal it is high time to develop Chemical Safety Programmers-risk management strategies and know-how for coping with chemical accidents and set up of a Central Authority for chemical safety management of toxic chemicals, and Government needs to promote awareness of responsibilities under the Code of Conduct on Pesticides and relevant FAO Guidelines and should implement international agreements regulating trade and use hazardous chemicals and upgrade facilities for chemical analysis.

QUESTIONNAIRE SUMMARY

Nepal

Selected Country Statistics:

Agricultural Population	**22.8 million**	**Agricultural Land**	**3.2 million ha**
GDP $5 835 million	Agric. GDP: 40.8%	GNI per capita: $240	Hunger: 17%
FAOSTAT Pesticide Data	Export $0.001 million	Import: $0.66 million	Use:

GDP = Gross Domestic Product; GNI = Gross National Income; Hunger = Population below minimum energy requirement; FAOSTAT = latest data entry between 1998 and 2002

Institutional Profile

Ministry	**Legislation**	**Registration**	**Licensing**	**Enforcement**	**Testing**	**Training**	**Monitoring**	
							Environm.	**Health**
Agriculture		PRMD	PRMD	PRMD, Dist.	NRAC	PRMD, Dist.	PRMD	PRMD
Environment								
Health								

Industry Associations:
Non-Governmental Associations: Soc. of Environment Journalist, Nepal Forum of Environmental Journalist

A. Pest and Pesticide Management

IPM policy declared?	**Yes**
IPM mentioned in…	
Crop Protection Policy?	**Yes**
Agric. Sector Policy?	**Yes**
Other laws/documents?	**Yes**
National IPM Program?	**Yes**
Dept: **DoA**	
IPM extension projects?	**Yes**
IPM research projects?	**Yes**
Pest resistance problems?	**Yes**

B. Testing, Quality Control and Effects

Laws for pesticide specifications?	**Yes**
Low quality products in market?	**Yes**
Quality control laboratory?	**Yes**
Own analyses in 2004: **10**	
Outside analyses in 2004:	

C. Health and Environmental Information

Data on pesticide poisoning cases?	**Yes**
occupational exposure cases: **15**	
accidental exposure cases: **660**	
intentional/suicide cases: **1 368**	
Pesticide poison facilities?	**?**
Number of facilities:	
Poison Information and Control Centers?	**Yes**
Number of centers: **1**	
Significant environmental contamination?	**?**
Data on effects on wildlife & ecosystems?	**?**
Pesticide residue monitoring system?	**Yes**
Number of analyses 2004: **124**	

D. Pesticide Manufacture, Use and Trade

Pesticide Volume	*Tons*	*$'000 Value*
Imports	**178**	**2 600**
Manufacture		
Exports		
Sales	**145**	**2 100**

Pesticide Use Profile	*Tons*	*$'000 Value*
Agriculture (total)	**142**	**2 050**
Insecticides	48%	
Fungicides	46%	
Herbicides	4%	
Other	1%	
Veterinary		
Public Health		
Household		
Other		
TOTAL	**142**	**2 050**

E. Selected Standards of Code of Conduct

Illegal trade estimates?	--
Estimated amount 2004	
Collection of old containers and pesticides?	**Yes**
Inventory of outdated/obsolete products?	**Yes**
Operational pesticide registration system?	**Yes**
Violations in 2004	
Existing facility licensing system?	**Yes**
Inspections in 2004	
Highly toxic products restricted?	**Yes**

Questionnaire responses: Yes = Yes; -- = No; ? = don't know; (blank) = no answer

PAKISTAN

by Rasheed Bashir Mazari

Introduction

The economy of Pakistan is largely based on agriculture. It contributes about 25 percent to the national economy, provides employment for over 44 percent of the labour force and is main source of income in rural areas, which accounts for 70 percent of total population. The well being of the economy depends largely on the production, processing and distribution of major products such as cotton, wheat, edible oil, sugar, milk and meat. In the last decade, agriculture grew at an annual average rate of 4.5 per cent and exhibited fluctuating trend mainly on account of weather conditions, pest attacks on crops, shortage of inputs and little attention given to its subsectors other than crop farming.

Plant protection measures currently comprise, largely, of the use of pesticides, which has grown from about 915 tons (230 tons active ingredient) in 1981 to 129 000 tons (28 500 tons active ingredient) in 2004. With regard to use, the most heavily covered crop is cotton followed by paddy, sugarcane, fruits and vegetables. Cotton alone accounts for about 70 percent of the total consumption of active ingredient of pesticides and this has resulted in the phenomenal rise in cotton production in the country.

The use of pesticides in Pakistan commenced in 1952. It started with the introduction of an aerial spraying program on the key crops such as, cotton, rice and sugarcane. Simultaneously, pesticides were also used for locust control. The desert locust control program was organized through an international network coordinated by the FAO.

Before 1971, pesticides to be imported were standardized by the Federal Government through Department of Plant Protection (DPP), since no rules and regulations were in place.

Agricultural Pesticides Ordinance (APO) was promulgated in 1971 to regulate import, manufacture, formulation, sale, distribution, use and advertisement of pesticides. **Agricultural Pesticides Rules** were made thereunder in 1973 and the whole business was put under regular standardization and registration with the help of Provincial Agriculture Departments. Pesticides are registered under the trade name (Form-1) after efficacy evaluation trials of two crop seasons by at least two research agencies including Provincial and Federal ones. The products to be approved under this scheme are first standardized by the provincial Governments with final approval granted by the Federal Government on advice of Agricultural Pesticides Technical Advisory Committee (APTAC). It normally takes three years to get a product approved under Form-I scheme.

In 1993, two new kinds of registration (Form-16 & Form-17) viz.; Generic Scheme and Permission/Registration Abroad Scheme were launched. Generic name registration is granted to products designated by the Federal Government, which are no valid patent right and are already tested and trialed on Farm-1. Permission (Registration Abroad) Scheme is conditional to the registration of new chemistries that are prior registered and used in any of the OECD countries or China. The result of liberalized policy of 1992 has been phenomenal. Import from diversified sources and induction of more than 350 new entrepreneurs as against about 30 until 1993 have given the desired results i.e. enhancement of healthy competition and the availability of effective and inexpensive pesticide products. Pesticide is the only agricultural input where the prices of frequently

used products are either contained or have declined by 30-40 percent generally and in few cases even up to 62 percent specially reduction in price despite devaluation of Pak Rupee.

The registration position of pesticide compounds under various schemes is as follows:

Form-1	192
Form-16 (Generic)	58
Form-17 (Registered Abroad)	155

Department of Plant Protection under the policy advice of the Ministry of Food, Agriculture & Livestock has the mandate of registration and management of pesticides meant for the plant/crop protection or agriculture purpose.

Recently the Federal Government has taken up the revision of Agricultural Pesticides Act (APA) to make it abreast with the recent developments in the world. Draft of APA 2005 is ready for approval of the competent for authority.

A. Pest and pesticide management

Reliance on IPM has been stressed in the National Agricultural policy of Pakistan in 1980. The National Agricultural Commission in its report published in March 1988 has given broad out lines of IPM and recommended that IPM techniques should be adopted for major crops by 1992 or 1993 and for all crops by 1995.

Excessive use of pesticide is checked through pest warning/scouting system executed by the provincial agricultural departments. Farmers are advised through print and electronic media to undertake application of pesticides only when the pest population crosses the economic threshold level (ETL). In this way judicious use of pesticides is encouraged. The Government has also instituted a National Integrated Pest Management (IPM) programme to minimize the use of pesticides.

Similarly trainings are imparted to farmers in safe handling, use and application of pesticides by the provincial governments and the technical staff of the industry.

B. Testing, quality control and effects in the field

The legislation on the specifications of pesticides already exists in the Agricultural Pesticides Rules 1973. Method of analysis involves CIPAC, AOAC, PAC etc.

The check on the quality of pesticides, curbing the practice of sale of adulterated/ sub-standard pesticides, is maintained through network of inspectors and pesticides laboratories. Officers of provincial Agriculture Department are appointed as inspectors. Their position is as follows:

Punjab	–	232
Sindh	–	074
N.W.F.P	–	157
Baluchistan	–	092
Federal (Department of Plant Protection)	–	015

There are at present 10 pesticides laboratories with Public/Semi-Government sector, 29 with the private sector. Additionally under new legislation 50 repackaging units are also required to established pesticides laboratories.

C. Health and environment information

Government with the coordination of industry takes care of human health and the environment. Rules 37 to 41 specially mention all the requirements, which are necessary for Health and Environment.

There are regular surveys on occupational poisoning cases among farmers and industrial workers. Two poison centers are established in the country. One is in Faisalabad and the other is in Karachi.

D. Trends in pesticide manufacturing, use and trade

Local manufacturing in the country is very limited and is restricted to aluminium phosphide, copper oxychloride and zinc phosphide only. Local formulation has increased from 14 percent in 1984 to about 70 percent of the total supply in 2004. There are over two dozen formulation plants in the country. For local formulation, the technical grade of a pesticide and other substances including emulsifier, carrier and stabilizer etc. are imported separately, which, together with a solvent, generally xylene (locally available), are blended in precise proportions to produce the finished product. Due to increasing consumption of pesticides, different advanced technologies are required for new formulations.

E. Selected standards

Occupational Hazards

The Government has taken appropriate measures to ensure safety in use of pesticides. Pesticides are not allowed to be handled by persons not having prior approval of their activities from the government. The government has enforced legislation requiring registration of pesticides dealers/venders, distributors, formulators and re-packers. The license for dealership/vending is issued only to a person who has been duly trained in safe storage, transportation and use of pesticides. The distributors, *inter alia,* are required to employ adequate number of agricultural graduates to ensure safety in handling and judicious use of pesticides. The formulators/re-packers are likewise required to have arrangements of safe storage, proper waste disposal and regular medical check up of workers. No manual re-packing/re-filling is permitted. The importers/formulators are required to undertake to supervise re-packing/re-filling and labeling process carried out at a plant duly registered and pass on pesticides to the distributors, dealers/vendors only in retail packing. No person can store pesticides unless permission for the same is issued to him.

Packaging

All packaging is done at registered plants using automatic/semi-automatic filling system. Most liquid pesticides, depending on their chemical nature, are filled in CO-EX and PET bottles or tin cans. Bottles have seals, caps and shrink wraps over them. Powder pesticides are packed in hermetically sealed sachets and granules are packed in plastic bags further contained in cotton bags. The packaging ensures that pesticides are not deteriorated during their shelf-lives as well as there is no leakage.

Labelling

The Agricultural Pesticides Rules provides an exhaustive guideline for labeling following the FAO Guideline covering necessary aspects of safety. Appropriate warning symbol in accordance with the WHO's recommendation is displayed on label. Withholding period of pesticides is also required to be mentioned.

Application methods

Foliar application through knap-sack/power sprayers is most popular followed by the tractor-mounted sprayers. Some pesticides are sprayed by ULV sprayers as well. Granular pesticides are broadcast manually. Use of protective clothing/gears is little due to hot and humid conditions prevailing in the fields. Special protective clothing/gears are required to be developed suiting to the climatic conditions.

Phasing out severely toxic pesticides

Pakistan is the one of the few countries in the region to have banned use of all severely toxic and hazardous pesticides included in the PIC and POP list in the early 1990s. In addition to PIC/POP pesticides, several other pesticides have also been banned. Recently the government is considering to ban all formulations of monocrotophos and methamidophos. Practically no pesticide falling in the WHO Category I is used. Due to availability of comparatively safe new chemistry molecules and IGRs at competitive prices, the use of pesticides falling into WHO Category II is also declining. List of banned pesticides is enclosed.

Pesticides disposal

The Agricultural Pesticides Rules provides that the destruction and removal of the empty packages and pesticides remains shall be affected in such a manner that sources of water supply are not contaminated. The unclean packages shall be destroyed in a way as to preclude the possibility of their being reused for any purpose other than as base material. Further procedures for disposal of surplus pesticides and pesticides containers have been notified in 1984 encompassing small use, commercial and municipal use, in situ-disposal; organized disposal and landfill disposal sites.

National legislation and enforcement

National legislation exists in the form of Agricultural Pesticides Ordinance 1971 which is supported by the Agricultural Pesticides Rules 1973. The Rules are amended from time to with the approval of Agricultural Pesticides Technical Advisory Committee (APTAC). APTAC is at liberty to nominate sub committees and can entrust them specific duties.

Liberalization of pesticide trade had been welcomed because it had given benefit to the farmers. Unfortunately, this has not been entirely problem free. Some unscrupulous elements found opportunity to indulge in unethical activities such as:

- Formulating pesticides using active ingredient in substandard quantity.
- Adulteration at supply chain, packing, distribution and marketing level.

These malpractices are affecting the plant protection quality and causing damage to the environment.

Problems

Lack of awareness

The farmers have inadequate knowledge about pesticides as to their suitability, application techniques and safety measures. This is one of the reasons of poor pest control, environmental pollution and health problems in some areas. Programs for guidance of the farmers in this respect are far and few. The pesticide industry does not put sufficient resources on dissemination of knowledge on pests, pesticides, environment and management techniques. In this area there is great scope of extension work in the public sector.

Identification of pest problem

The stage of a particular insect pest is extremely important while determining the need for chemical treatment. Few insects can only be controlled at a particular stage where they have weak links in their life cycle. Care should be taken that the chemical sprays are directed where the pests are available. Clean cultivation helps to achieve better pest control. Those farmers who pay attention to these points, get more yield.

Selection of pesticides

Normally selective chemicals appear to offer an almost ideal means of pest control. However, only a few such chemicals have been discovered and developed for commercial use. The pesticides that are harmless to predators and parasites are ideal for IPM program. Although their numbers are limited but they are being widely recommended. Pesticides like Emamectin Benzoate, Abamectin, indoxacarb and spinosad are known to be selective in their mode of action. Until more selective pesticides are commercially available at reasonable expenses more judicious use of pesticides should be made.

Underdosing

Underdosing of pesticides brings more harm than benefit in the shape of triggering development of resistance in the pests. To get good control of pests, the recommended doses should be used. Sometimes the farmers reduce the dose thinking that the pest pressure is not much. Underdosing is helping in the resurgence of the pests. The problem of pest control is exaggerated. Insects develop resistance to insecticides more rapidly if underdosing is used. Small farmers tend to use less dose of pesticide.

Indiscriminate use of pesticides

Plant protection has become very specific and objective oriented. It is important to identify the problem first and then buy the chemical otherwise the money will go waste. Indiscriminate use will eliminate natural enemies and cause secondary pests to develop. Field biologists have studied the effects of improper pesticide use. The indiscriminate use of pesticides results in unsatisfactory pest control, environmental pollution and health problems.

LIST OF PESTICIDES BANNED IN PAKISTAN

Active Ingredients

1.	B.H.C	13.	Dieldrin
2.	Binapacryl	14.	Disulfoton
3.	Bromophos ethyl	15.	Endrin
4.	Captafol	16.	Ethylene dichloride + Carbontenachloride
5.	Chlordimeform	17.	Leptophos
6.	Chlorobenzilate	18.	Mercury Compound
7.	Chlorthiophos	19.	Mevinphos
8.	Cyhexatin	20.	Toxaphene
9.	Dalapon	21.	Zineb
10.	DDT	22.	Heptachlor
11.	Dibromochloropropane + Dibromochloropropene	23.	Methyl Parathion
		24.	Monocrotophos (all formulations)
12.	Dicrotophos	25.	Methamidophos (all formulations)

Formulations

Dichlorvos (above 500 g/l)
Phophamidon (above 500 g/l)

Pesticides Not Registered

Aldrin (POP/PIC)
Mirex (POP)
Chlordane (POP/PIC)
Dinoseb (PIC)
Ethylene di bromide (PIC)
Parathion (PIC)
Fluroacetate (PIC)

QUESTIONNAIRE SUMMARY

Pakistan

Selected Country Statistics:

Agricultural Population	**75 million**	**Agricultural Land**	**22.1 million ha**
GDP $68 815 million	Agric. GDP: 23.2%	GNI per capita: $470	Hunger: 20%
FAOSTAT Pesticide Data	Export $0.6 million	Import: $59.6 million	Use: 22 482 ton

GDP = Gross Domestic Product; GNI = Gross National Income; Hunger = Population below minimum energy requirement; FAOSTAT = latest data entry between 1998 and 2002

Institutional Profile

Ministry	**Legislation**	**Registration**	**Licensing**	**Enforcement**	**Testing**	**Training**	**Monitoring**	
							Environm.	**Health**
Agriculture	MINFAL	PPD	PPD					
Environment								
Health								
Other				Fed, Prov, Dist	Public/Private	Public/Private	Public/Private	Public/Private

Industry Associations: CropLife Pakistan, PCPA, PIFA
Non-Governmental Associations: Farmer Vision Forum, Punjab Pesticide Dealer Assoc.

A. Pest and Pesticide Management	
IPM policy declared?	**Yes**
IPM mentioned in…	
Crop Protection Policy?	**Yes**
Agric. Sector Policy?	**Yes**
Other laws/documents?	**Yes**
National IPM Program?	**Yes**
Dept: **NARC**	
IPM extension projects?	**Yes**
IPM research projects?	**Yes**
Pest resistance problems?	--

B. Testing, Quality Control and Effects	
Laws for pesticide specifications?	**Yes**
Low quality products in market?	--
Quality control laboratory?	**Yes**
Own analyses in 2004:	
Outside analyses in 2004:	

C. Health and Environmental Information	
Data on pesticide poisoning cases?	--
occupational exposure cases:	
accidental exposure cases:	
intentional/suicide cases:	
Pesticide poison facilities?	**Yes**
Number of facilities: **2**	
Poison Information and Control Centers?	**Yes**
Number of centers: **1**	
Significant environmental contamination?	--
Data on effects on wildlife & ecosystems?	--
Pesticide residue monitoring system?	**Yes**
Number of analyses 2004:	

D. Pesticide Manufacture, Use and Trade		
Pesticide Volume	*Tons*	*$'000 Value*
Imports	**40 482**	**147 860**
Manufacture	**89 116**	**63 020**
Exports	**0**	**0**
Sales	(formulated)	
Pesticide Use Profile	*Tons*	*$'000 Value*
Agriculture (total)	**129 598**	**172 300**
Insecticides	94%	
Fungicides	2%	
Herbicides	5%	
Other	0%	
Veterinary	**1 000**	**3 350**
Public Health	**200**	**670**
Household	**5**	**16**
Other		
TOTAL		

E. Selected Standards of Code of Conduct	
Illegal trade estimates?	**Yes**
Estimated amount 2004: none	
Collection of old containers and pesticides?	**Yes**
Inventory of outdated/obsolete products?	**Yes**
Operational pesticide registration system?	**Yes**
Violations in 2004	
Existing facility licensing system?	**Yes**
Inspections in 2004	
Highly toxic products restricted?	**Yes**

Questionnaire responses: Yes = Yes; -- = No; ? = don't know; (blank) = no answer

PHILIPPINES

by Paz B. Austria

Introduction

The Bureau of Plant Industry (BPI) with its National Pesticide Analytical Laboratory (NPAL) is closely linked with the Fertilizer and Pesticide Authority (FPA), the regulatory agency for pesticide.

Under Presidential Decree 1144, Letter of Instruction 986, Magna Carta Act of Small Farmers and Consumers Act of the Philippines, the BPI is mandated to monitor pesticide residues in agricultural crops.

Whenever there are issues related to pesticides, the Department of Agriculture (DA) through BPI and FPA work together to address the said issues.

A. Pest and pesticide management

Pursuant to Memorandum Order No. 126 dated May 3, 1993, the DA in implementing Kasaganaan ng Sakahan at Kalikasan (KASAKALIKASAN), the Philippine National Integrated Pest Management (IPM) Program in major rice, corn and vegetable growing provinces in the Philippines. Specifically, KASAKALIKASAN aims to 1) promote sustainability by helping farmers apply IPM principles in their crop production while learning to optimize the use of resources through the management of the agro ecosystem and 2) develop the farmers' ability to make critical and rational decision that renders their farming systems more productive, profitable and sustainable.

B. Testing, quality control and effects in the field

The quality of pesticides is being tested by BPI-NPAL and other private laboratories. The BPI-NPAL monitors pesticide and provide analytical services to industry and to the regulatory agency joint effort to monitor pesticide use in the field is being conducted through information campaign.

C. Environmental contamination

Monitoring environmental contamination is the responsibility of the Department of Environment and Natural Resources and DA. BPI analyzed environmental samples through a Memorandum of Agreement with other agency with related mandate.

D. Trends in pesticide manufacture, use and trade

Table attached showing the summary of the trend on the importation of pesticide.
(Based on CAIP Issuances)

TYPE/USE	2000 VOLUME (K/L)		2001 VOLUME (K/L)		2002 VOLUME (K/L)		2003 VOLUME (K/L)		2004 VOLUME (K/L)	
	Technical Materials	Formulated Products	Technical Materials	Formulated Products	Technical Materials	Formulated Products	Technical Materials	Formulated Products	Technical Materials	Formulated Products
Insecticides	970 644	5 093 778	738 950	4 531 727	707 423	7 751 018	771 391	6 682 706	912 045	5 162 683
Fungicides	48 777	2 099 984	20 606	4 017 805	26 000	26 611 144	12 000	5 310 802	22 020	6 241 224
Herbicides	432 760	1 196 632	778 852	2 026 601	7 153 613	2 606 718	8 421 791	3 230 665	605 693	5 847 059
Molluscicides	124 800	321 100	207 600	274 683	43 000	79 824	38 600	82 723	4 000	195 825
Nematicides	48 600	336 630	90 900	304 006	65 000	738 970	38 600	548 320	750	76 833
Rodenticides	49 060	49 900	17 605	43 128	6 200	67 145	–	107 044	124 200	105 532
OTHERS*	13 000	3 015 480	10 800	4 884 427	1 000	4 446 965	10 425	49 303	64 800	829 757
Fumigants	–	48 238	–	72 531	–	114 639	22 010	117 350	–	93 132
Termiticides	–	12 800	45 360	193 977	–	92 824	4 500	4 567 433	–	6 249 147
TOTALS	**1 687 641**	**12 174 542**	**1 910 673**	**16 348 884**	**8 002 236**	**42 509 246**	**9 319 317**	**20 696 346**	**1 733 508**	**24 801 192**

*OTHERS – surfactants, emulsifiers, wood preservatives, etc.

E. Selected standards

The pesticide disposal system in the Philippines is not addressed clearly.

Pesticide control legislation, registration system and enforcement is available through the Regulatory Agency, the FPA, but enforcement is very weak, due to lack of information education campaign on the hazards brought about by the improper use of pesticide (chemical input).

Conclusion and comments

The pesticide management system in the country is properly in place. However, lack of information on the risk and hazard of pesticide use. It is therefore recommended to intensify information education campaigns.

QUESTIONNAIRE SUMMARY

Philippines

Selected Country Statistics:

Agricultural Population	**30.0 million**	**Agricultural Land**	**10.7 million ha**
GDP $80 574 million	Agric. GDP: 14.7%	GNI per capita: $1 080	Hunger: 22%
FAOSTAT Pesticide Data	Export $5.5 million	Import: $87.5 million	Use:

GDP = Gross Domestic Product; GNI = Gross National Income; Hunger = Population below minimum energy requirement; FAOSTAT = latest data entry between 1998 and 2002

Institutional Profile

Ministry	**Legislation**	**Registration**	**Licensing**	**Enforcement**	**Testing**	**Training**	**Monitoring**	
							Environm.	**Health**
Agriculture	BPI, FPA	FPA	FPA	FPA	NCPC	FPA	NPAL	NPAL
Environment								
Health								

Industry Associations: CropLife Philippines, Crop Protection Assoc. of the Philippines, Philippine Manuf. Assoc.
Non-Governmental Associations: PAN

A. Pest and Pesticide Management	
IPM policy declared?	**Yes**
IPM mentioned in…	
Crop Protection Policy?	**Yes**
Agric. Sector Policy?	**Yes**
Other laws/documents?	**Yes**
National IPM Program?	
Dept:	
IPM extension projects?	**Yes**
IPM research projects?	**Yes**
Pest resistance problems?	**Yes**

B. Testing, Quality Control and Effects	
Laws for pesticide specifications?	**Yes**
Low quality products in market?	**Yes**
Quality control laboratory?	**Yes**
Own analyses in 2004:	
Outside analyses in 2004:	

C. Health and Environmental Information	
Data on pesticide poisoning cases?	--
occupational exposure cases:	
accidental exposure cases:	
intentional/suicide cases:	
Pesticide poison facilities?	**?**
Number of facilities:	
Poison Information and Control Centers?	**?**
Number of centers:	
Significant environmental contamination?	--
Data on effects on wildlife & ecosystems?	--
Pesticide residue monitoring system?	**Yes**
Number of analyses 2004:	

D. Pesticide Manufacture, Use and Trade		
Pesticide Volume	*Tons*	*$'000 Value*
Imports	**31 735**	
Manufacture		
Exports		
Sales		
	(formulated)	
Pesticide Use Profile	*Tons*	*$'000 Value*
Agriculture (total)	**22 470**	
Insecticides	32%	
Fungicides	33%	
Herbicides	34%	
Other		
Veterinary		
Public Health		
Household		
Other	**9 265**	
TOTAL	**31 735**	

E. Selected Standards of Code of Conduct	
Illegal trade estimates?	
Estimated amount 2004	
Collection of old containers and pesticides?	--
Inventory of outdated/obsolete products?	--
Operational pesticide registration system?	--
Violations in 2004	
Existing facility licensing system?	--
Inspections in 2004	
Highly toxic products restricted?	**Yes**

Questionnaire responses: Yes = Yes; -- = No; ? = don't know; (blank) = no answer

REPUBLIC OF KOREA

by Su-Myeong Hong

Registration and management scheme in the Republic of Korea

Pesticide registration in the Republic of Korea

The Pesticide Management Act (PMA) has been revised and re-enforced several times since it was promulgated in 1957 for the first time in the Republic of Korea. Pesticides had been registered by Ministry of Agriculture and Forestry (MAF) till November 1996 under the legislation system of pesticide commodity permission and commodity notification. Upon adopting the notification system of pesticide formulation, everybody was able to register the notified pesticide by submitting the formulation recipe and supply certificate of the technical grade of active substances (TGAI). Thus, the Republic of Korea became a heart of generic pesticides all over the world because pesticide formulators were intensively importing low-priced TGAIs with less confidence of the quality. In consequence, the Government entirely revised the PMA with full registration scheme and pesticide registration was given to the Administrator of Rural Development Administration (RDA) which has an activity on research and extension services involving various disciplines of agriculture as well as expert resources related with crop protection since December 1996. Henceforth, there has been several enforcement of PMA to reduce pesticide risks including special reviews of distrustful pesticides in safety on dietary intake of residues or non-targeted environmental impact, introduction of re-registration every ten year cycle, a separate registration scheme for bio-pesticides, etc.

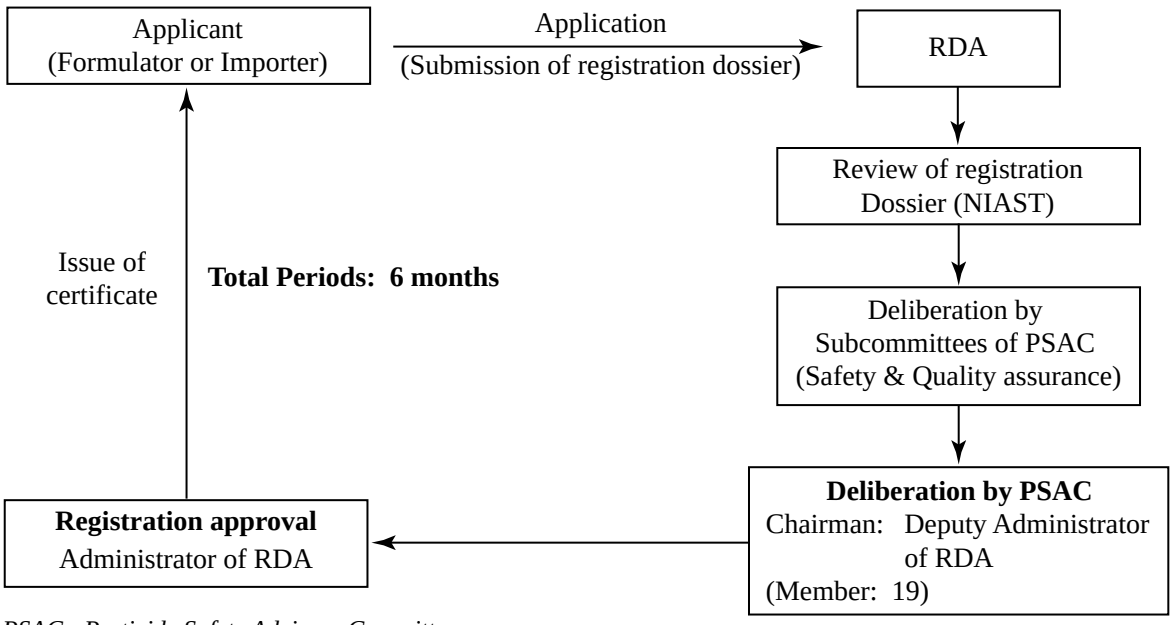
Before a pesticide is considered for registration in Korea, it must be reviewed to identify the potential risks to human health and the environment as well as demonstrate its biological efficacy to target pests. For documents on application for agrochemical registration which applied annually, it was made sure that safe agrochemical were registered through quick and accurate reviewing for each fields, based on agrochemical management act, article 9.

A total of 297 product items were applied for the registration in Korea during 2004. The data of each item including efficacy, phytotoxicity, toxicity and residue test were submitted for being reviewed by each expert. The reviewing results of them were that 259 items were registered while 24 items were rejected and 14 items were asked to submit additional data. 76 items for minor crops and 52 items by official authority were also reviewed for registration.

Toxicity category for each pesticide to be registered was classified and notified on the basis of its acute toxicity to mammals and fish. Eight formulations were classified into toxicity category III and 92 formulations were classified into toxicity category IV. Fish toxicity categories were assigned to I, IIs, II and III for 15, 1, 15 and 78 formulations, respectively.

It was shown that there were 35 incongruities for data supplement or holding of registration in the result for assessment of application requirements in 2004. The summary registration applications were as below; 127 formulations 219 applications in fungicide, 116 formulations 207 applications in insecticide, 57 formulations 67 applications in herbicide, 11 formulations 16 applications in growth regulator and etc.

Pesticide registration procedure in the Republic of Korea



PSAC: Pesticide Safety Advisory Committee

Re-registration

In line with demands for ever more safety assurance being used on pesticides and increased international harmonization efforts, re-registration program had included in PMA as of December 1996 to ensure that older generation, but still widely used, products meet today's qualified environmental and safety standards. Thus a total of 244 products registered before December 1986, which had been informed to fulfil the data gap, were evaluated the data. Of the re-assessed products, 39 products were withdrawn from registration, 32 had target crops or pests cancelled, 31 were re-classified in their toxicity grade, 130 had their pre-harvest intervals (PHIs) changed, and 60 were amended with precautions for reduction of acute mammal or environmental exposure on December 6, 2001.

Registration of bio-pesticides to support biologically-based farming practices

A differentiated registration scheme for microbial pesticides was already in operation in order to promote and spread the environmentally sound ones in crop protection area since 2001. The principle of registration process basically was two tiered approaches on data requirements and assessment. Meanwhile, the share of products, amount and value of the bio-pesticides occupies still minor portion like other countries. RDA is conducting intensive work together with related agencies to extend the bio-pesticides to biochemical pesticides and natural enemies since 2004.

With modification/addition in test standards, methods, and application requirement, the application regulation for biopesticides was established and proposed, based on convenient Microbial Pesticide Application Regulations, in comparison with foreign registration systems for biochemical pesticide (which include pheromone and natural chemicals). And 6 incongruities were found in 54 formulations (111 items) of registration application samples, current pesticide samples, and petition samples for quality control for biopesticides. These incongruities were caused in 3 active ingredient absence/deficiencies, 3 physical inferiorities. The analysis method of new active ingredients for later quality assurance was established and notified as inspection method for pesticides.

Enforcing test guideline (TG)s and data assessment scheme of pesticide residue studies

TG for pesticide residue studies in/on crops and environment compartments has enforced to secure the food safety and to prevent environment deterioration by introduction of pesticides into agro-ecosystem. Crop residue data has been generated by dissipation study in/on target crop after application to the crop only; however, in recent post-harvest stability and metabolism studies in the target crop have emphasized to fulfill safety of post-harvest crops being exported and to clarify fate and their metabolites of the applied pesticides. TG for stability tests of post-harvest and metabolism studies in the target crop was established in harmonization with EU, OECD, and US/EPA/OPP guidelines. In addition, TG for pesticide adsorption/desorption study was also set up, which is suitable for local agricultural situation. Those TGs and data assessment schemes of pesticide residue were conveyed to the relevant steering subcommittee of Pesticide Management Committee for adopting the legal enforcement.

Risk assessment tools

Continued work was conducted to advance the science needed to understand and accurately assess the potential risks that pesticide can pose to human health. The advanced risk assessment schemes to be implemented by OECD countries such as USA and UK were investigated for setting up new risk assessment tools in Korea. Risk assessment tool for pesticide handlers was newly introduced through modification of EUROPOEM. Dietary risk assessment for consumer was established with two methods, namely MOE approach for non-carcinogen and Q1* approach for carcinogen pesticides.

Standards and methods for efficacy/phytotoxicity assessment and test of pesticides

In concern of efficacy/phytotoxicity assessment standards, the test method which was added “integrated test method with usage and nature of pesticide” was notified for test result requirements for growth regulators. In application test standards and methods, revision was made in the contrast agrochemicals for different pests and pathogens, major investigation items, minimal ratio of ‘untreated pathogenicity.’ In addition, new standards and methods for “storage improvement after harvest” were established and notified.

Special review

The pesticides having an argument with safety or banned in use in OECD countries have been reviewed in accordance with PMA process. Pesticides reviewed are given as follows:

Year	Reviewed pesticide	Dealing actions
1994	Alachlor, Captan, EPN Folpet, Monocrotophos Parathion, Phospamidon	Limitation of annual production Enforcement on label incl. pictogram
1995	Azinphos-methyl, Azocyclotin, Demeton-s-methyl	Amendment of label incl. Pictogram Reduction of annual production
1996	Carbofuran, Neoasozin, Omethoate	Amendment of label incl. Pictogram Limitation of annual production
1997	Procymidone, Ethoprofos Paraquat, Diazinon, Cartap	Cancellation of target crops, Enforcement of Label & aquatic toxicity, Amendment of handling regulation
1999~	Molinate	Being reviewed safety on aquatic organisms

Pesticide quality analysis

To revise the Korean pesticide test guidelines internationally harmonized, many guidelines were collected and reviewed from other countries including US/EPA, EU, OECD and Japan. The result of reviewing collections found that there were many guidelines to be amended, which are stability test and degradation test of active substance, storage stability test and so on. Draft test guideline for physico-chemical properties of pesticide active ingredients was made.

To evaluate pesticide product qualities, 100 pesticide technical grade, 923 products in circulation, 131 products for registration trials, 117 products for registration and 28 products on civil petition were analyzed. 14 products of those were declared inadequate, new official analytical methods of newly-registration of 11 items (Simeconazole etc.) were fixed and the provisional KOPAC methods of Etofenprox etc. were modified. This laboratory has participated in the CIPAC collaborative study on Prallethrin analysis and IAEA Coordinated Research Project on elaboration of multi-analytical method for quality control of Isoprothiolane and IBP.

Impurities in TGAIs

TGAIs being used for pesticide formulations contain known or unknown toxicants due to the purity, PMA announced the recognized toxic impurities which might contaminate in the final pesticide products. All the formulators have to inform RDA of the qualitative data on the impurity in case they manufacture the pesticide products. All the formulators have to inform RDA of the qualitative data on the impurity in case they manufacture the pesticides using relevant TGAIs. The announced impurities are as below.

TGAI	Announced impurity	Violation content
Chlorthalonil	Hexachlprbenzene (HCB)	0.05%
Dicofol	Compounds related with DDT	0.1%
EDBC (Mancozeb)	Ethylene thiourea	0.5%
Maleic hydrazine	Hydrazine	1 ppm
Oxyfluorfen	Perchlorinate ethylene	200 ppm
Trifluralin	Nitrosoamine	0.5 ppm

Re-formulating pesticide products with expired shelf-life on the market

Pesticide products on the market with expired shelf-life are being collected by formulators voluntarily, transported to their factory, and re-formulated in accordance with the physicochemical parameters of their registration profiles. A remarkable reduction of obsolete pesticides on the market was achievable by adopting this system.

Pesticide use survey

Pesticide usage survey was made on leaf vegetables growers and pesticide sellers. Input amounts per unit on leaf vegetables was surveyed as 3.91 kg/ha on cabbage of field cultivation, 2.93 on cabbage of greenhouse, 0.76 on lettuce, 0.55 on spinach, 1.34 on perilla leaf, 4.89 on leek and 0.42 kg/ha (with active ingredient) on young radish, respectively.

Survey on pesticide use pattern is being performed in a four year cycle; rice, orchard fruits, leafy vegetables and fruit vegetables. Annual input of pesticide in arable paddy rice was surveyed in 1999 and 2003. Korea Crop Protection Association (KCPA) publishes pesticide year book which

contains extensive information; list of registered pesticides, imported and exported amount, produced and consumed amounts at factory's gate, etc. The survey on rice over the last two cycle revealed that the statistics of KCPA on rice was able to represent visiting survey on end-user's level with more than 90 percent of fitness; 5.4 kg of TGAI/ha in 2003. Hereafter, the indicator on rice will be provided with the production statistics.

Compliance education on pesticide safe use

In order to promote compliance through education activities, Pesticide Safety Division of NIAST supported other related organizations to conduct education for farmers, pesticides dealer and public servants regarding agricultural industry. PSD staffs participated in many education programs as lecturers.

Pesticide residual monitoring

In Korea, several organizations are being involved in the mission of residue monitoring as far as agricultural produces are concerned; National Institute of Agricultural Science and Technology (NIAST) in the field, National Agricultural Products Quality Management Service (NAPQMS) under MAF at farmer's gate, and KFDA at basket level. Monitoring activities of pesticides residues in/on agricultural crops in the field at harvest have been concentrated on rice, fresh vegetables and fruits. The surveyed average residue data showed that no violation was recorded in rice, very small portion (less than 1 percent) of violation in fruits, and still small portion (around 1 percent) of violation in vegetables. The monitored data on pesticide residue have been fed back to the farmer so that they are able to reference pesticide use calendar to produce listed on food chain of wholesale markets or department stores is being done to provide healthy and safe food supply. In case the produce violated the MRLs, the farmer is unable to list his/her produce on the market for a certain period of time. This voluntary surveillance system devoted in a greater extent to reduce dietary exposure caused by pesticide residues.

Generation of temporal maximum residue limit (MRL) and pre-harvest interval (PHI) of pesticides for ensuring safe agro-products

A total of temporal 252 MRLs involving 96 active ingredients in 41 agricultural crops were transferred to the Korean Food and Drug Administration (KFDA). The MRLs were established from the local residue data in/on the target crops and chronic toxicity data submitted from the pesticide manufacturers. Most MRLs were re-assessed in the Food Safety Committee under KFDA, in which almost all the MRLs has established as national ones. At the same time, 122 PHIs in 38 crops were notified by Rural Development Administration (RDA), which were generated from the dissipation data of the residue in/on the crop and from their MRLs.

Comments

Korea government has set the goal to reduce pesticide use by 50 percent during past two decades. Even through many other intensives have been provided to achieve the goal including IPM, government-driven introduction of biological based pesticides or natural enemies, most commonly practiced crop protection is being done by chemical pesticides. Furthermore, top ten pesticides from the total pesticide sales seizes upon about 50 percent. However, they are still used all over the world.

Agicultural vetinary chemicals management is another vacant area in the Republic since RDA is responsible for pesticides used in agriculture only. The government had several meeting to designate the responsible agency taking care of biocides or agvet chemicals. For the time being, each chemical is being managed in relevant organization.

Crop strengtheners or environmentally friendly crop protection agents are illegally on Korean market without registration, which resulted in crop damages for farmers including poor protection activities and relatively high costs. Quality control and assurance methodologies have to be established to reduce the damages as well as unpredictable risk to worker and environmental compartments.

QUESTIONNAIRE SUMMARY

Republic of Korea

Selected Country Statistics:

Agricultural Population	**3.6 million**	**Agricultural Land**	**1.9 million ha**
GDP $476 690 million	Agric. GDP: 4.0%	GNI per capita: $9 930	Hunger: 0%
FAOSTAT Pesticide Data	Export $29.0 million	Import: $78.5 million	Use: 24 557 ton

GDP = Gross Domestic Product; GNI = Gross National Income; Hunger = Population below minimum energy requirement; FAOSTAT = latest data entry between 1998 and 2002

Institutional Profile

Ministry	**Legislation**	**Registration**	**Licensing**	**Enforcement**	**Testing**	**Training**	**Monitoring**	
							Environm.	**Health**
Agriculture	RMB	RMB	RMB	RMB, NIAST	NIAST	NIAST	NIAST	NIAST
Environment								
Health								

Industry Associations: Korea Crop Protection Assoc.
Non-Governmental Associations: Consumers Korea

A. Pest and Pesticide Management	
IPM policy declared?	
IPM mentioned in…	
Crop Protection Policy?	
Agric. Sector Policy?	**Yes**
Other laws/documents?	
National IPM Program?	**Yes**
Dept: **ITCC/UNDP**	
IPM extension projects?	--
IPM research projects?	--
Pest resistance problems?	--

B. Testing, Quality Control and Effects	
Laws for pesticide specifications?	**Yes**
Low quality products in market?	--
Quality control laboratory?	**Yes**
Own analyses in 2004: **1 080**	
Outside analyses in 2004:	

C. Health and Environmental Information	
Data on pesticide poisoning cases?	--
occupational exposure cases:	
accidental exposure cases:	
intentional/suicide cases:	
Pesticide poison facilities?	--
Number of facilities:	
Poison Information and Control Centers?	--
Number of centers:	
Significant environmental contamination?	--
Data on effects on wildlife & ecosystems?	**Yes**
Pesticide residue monitoring system?	**Yes**
Number of analyses 2004: **850**	

D. Pesticide Manufacture, Use and Trade		
Pesticide Volume	*Tons*	*$'000 Value*
Imports	**15 751**	**214 145**
Manufacture	**23 087**	**811 920**
Exports	**2 967**	**20 951**
Sales	**26 610**	**842 638**
Pesticide Use Profile	*Tons*	*$'000 Value*
Agriculture (total)	**24 250**	**842 638**
Insecticides	31%	36%
Fungicides	37%	35%
Herbicides	22%	25%
Other	10%	4%
Veterinary		
Public Health		
Household		
Other		
TOTAL		

E. Selected Standards of Code of Conduct	
Illegal trade estimates?	--
Estimated amount 2004	
Collection of old containers and pesticides?	**Yes**
Inventory of outdated/obsolete products?	--
Operational pesticide registration system?	**Yes**
Violations in 2004:	
Existing facility licensing system?	**Yes**
Inspections in 2004: **22**	
Highly toxic products restricted?	**Yes**

Questionnaire responses: Yes = Yes; -- = No; ? = don't know; (blank) = no answer

SINGAPORE

by Agnes Chin

Introduction

Singapore is not an agricultural country. Nearly 95 percent of fresh fruits and vegetables are imported into Singapore from all over the world such as Malaysia, China, Thailand, USA and Indonesia. Only about 5 percent of the fresh vegetables are locally produced. To date, about 56 local farms produce fresh vegetables for commercial sale and 2 fruit orchards in Singapore.

Monitoring of pesticide violations in imported fresh fruits and vegetables

In view of the heavy reliance on imported fresh fruits and vegetables for local consumption, the Agri-Food and Veterinary Authority of Singapore's (AVA) main mission is to ensure that the imported and locally produced fresh fruits and vegetables are safe and wholesome for consumption. Currently, AVA has no restrictions to the import of fresh fruits and vegetables from all countries into Singapore. Under the Control of Plants Act, any person who wishes to import or transship fresh fruits and vegetables into Singapore needs to obtain a licence from AVA. For fresh fruits and vegetables imported into Singapore from the South American tropical countries, a phytosanitary certificate from the country of origin is also needed to certify that the fresh fruits and vegetables are free from South American Leaf Blight or they are sourced from South American Leaf Blight free regions.

To date, there are three inspection programmes in place for fresh fruits and vegetables imports, namely: Routine Monitoring Programme (MSP), Enhanced Surveillance Programme (ESP) and Enhanced Enforcement Programme (EEP) cum Restricted Import Measure (RIM). According to the risk levels of the commodities with reference to the history of violations, the various commodities are inspected under the three different programmes.

In accordance to the Control of Plants Act, the imported consignment needs to comply with the food safety requirements and standards. Singapore adopts the standards of the Joint FAO/WHO Codex Alimentarius Commission and the Tenth Schedule of the Food Regulations. Any imported consignment of fresh fruits and vegetables shall not contain any prohibited pesticide residue, or levels of pesticide residues or harmful chemicals exceeding the permitted levels set by these standards.

Fresh fruits and vegetables under MSP will be randomly sampled for laboratory analysis so as to build up a database to sieve out problematic fruits and vegetables and elevate them to the next higher level, the ESP. Under ESP, the consignment will be detained after inspection, pending laboratory results and if the consignment failed the laboratory analysis, it will be destroyed. If a commodity under ESP still doesn't achieve satisfactory results, it will be elevate to the next level, the EEP cum RIM. Under this program, in addition to the consignment being detained after inspection pending laboratory results and destruction of the failed consignment, enforcement actions will also be taken against the importers concerned. RIM will be invoked if a commodity under EEP still remains problematic whereby only farms approved by AVA from that particular country can export their products to Singapore.

With the implementation of the Enhanced Enforcement Programme (EEP) in July 1999, the pesticide violation rate for imported vegetables under our enforcement programmes was effectively

reduced to around 5 percent, which is the target set by AVA. Commodities under this programme were closely monitored for pesticide violations and satisfactory results had been maintained over the years. If a commodity is found to fail the pesticide residue analysis, the importer of this failed consignment would be notified and he will convey the message the farmers. Regular feedback will also be provided to authorities concerned in the producing countries so as to monitor the farms and improve the situation.

Besides all the punitive actions, AVA does have incentive scheme for importers who achieve satisfactory laboratory results for their vegetables consignment under EEP. Importers will qualify for this scheme if they have 10 consecutive consignments of a specific vegetable passing the pesticide residue analysis, after which the subsequent consignment of that specific vegetable will be inspected without detention. Thus, they can sell off their vegetables faster and obtain higher prices. However, once the consignment fails, inspection of the next consignment will revert back to inspection with detention.

Monitoring of pesticide violations in locally produced fresh fruits and vegetables

In accordance with the Control of Plants Act, AVA also imposed stringent control on the usage of pesticides in the local fruits, vegetables and ornamentals farms. All pesticides used in the cultivation of any crops for commercial sale in the farm need to be registered by AVA. Moreover, the application of these pesticides must be done or supervised by a pesticide operator who is certified by AVA. AVA also conducts regulars checks and inspections on the farms to check for any non-compliances with regards to whether the pesticides application was carried out/supervised by certified operator, whether the pesticides are stored in accordance with the regulations in the Control of Plants Act, whether the empty containers & packages of pesticide were properly disposed off in accordance with the regulations in the Control of Plants Act and also, whether pesticides are used properly and correctly in the farms. Samples of vegetables, fruits and ornamental plants produced in the farms will also be taken for laboratory analysis to check for any residues of unregistered pesticides or residues of registered pesticides above the permitted levels. For any non-compliances found during inspection, enforcement actions will be taken against the licensee or the pesticide operators of the farm.

AVA is now in the preparations of a pesticides safety course for our pesticide operators to help to enhance their knowledge on the applications and safety of pesticides used in their farms. The course will be held once a year for all pesticide operators whose license will expire in the following year.

Conclusion

AVA imposed stringent checks on imported and locally produced fresh fruits and vegetables to ensure that they are safe and wholesome for consumption. Through regular feedback with the importers and the authorities from the exporting countries, a better networking system is established so as to facilitate discussion and working out of suitable plans to overcome any problem that might arise and also to better improve the pesticide violation situations of the imported fresh fruits and vegetables into Singapore.

QUESTIONNAIRE SUMMARY

Singapore

Selected Country Statistics:

Agricultural Population		**Agricultural Land:**	
GDP	Agric. GDP:	GNI per capita:	Hunger:
FAOSTAT Pesticide Data	Export $122.4 million	Import: $115.2 million	Use:

GDP = Gross Domestic Product; GNI = Gross National Income; Hunger = Population below minimum energy requirement; FAOSTAT = latest data entry between 1998 and 2002

Institutional Profile

Ministry	**Legislation**	**Registration**	**Licensing**	**Enforcement**	**Testing**	**Training**	**Monitoring**	
							Environm.	**Health**
Agriculture	AVA	AVA		AVA	AVA	AVA		
Environment								
Health								
Other								

Industry Associations:
Non-Governmental Associations:

A. Pest and Pesticide Management	
IPM policy declared?	--
IPM mentioned in…	
Crop Protection Policy?	--
Agric. Sector Policy?	--
Other laws/documents?	--
National IPM Program?	--
Dept:	
IPM extension projects?	**Yes**
IPM research projects?	**Yes**
Pest resistance problems?	--

B. Testing, Quality Control and Effects	
Laws for pesticide specifications?	--
Low quality products in market?	**?**
Quality control laboratory?	**?**
Own analyses in 2004:	
Outside analyses in 2004:	

C. Health and Environmental Information	
Data on pesticide poisoning cases?	--
Total (1996):	
occupational exposure cases:	
accidental exposure cases:	
intentional/suicide cases:	
Pesticide poison facilities?	**?**
Number of facilities:	
Poison Information and Control Centers?	**?**
Number of centers:	
Significant environmental contamination?	--
Data on effects on wildlife & ecosystems?	--
Pesticide residue monitoring system?	**Yes**
Number of analyses 2004: **113**	

D. Pesticide Manufacture, Use and Trade		
Pesticide Volume	*Tons*	*$'000 Value*
Imports		
Manufacture		
Exports		
Sales		
Pesticide Use Profile	*Tons*	*$'000 Value*
Agriculture (total)		
Insecticides		
Fungicides		
Herbicides		
Other		
Veterinary		
Public Health		
Household		
Other		
TOTAL		

E. Selected Standards of Code of Conduct	
Illegal trade estimates?	--
Estimated amount 2004	
Collection of old containers and pesticides?	**Yes**
Inventory of outdated/obsolete products?	--
Operational pesticide registration system?	**Yes**
Violations in 2004	
Existing facility licensing system?	**?**
Inspections in 2004	
Highly toxic products restricted?	**Yes**

Questionnaire responses: Yes = Yes; -- = No; ? = don't know; (blank) = no answer

SRI LANKA

by J.A. Sumith

Executive Summary

Pest management in Sri Lanka is mostly pesticide dependent and the annual imports of pesticides cost around 0.1 percent of Gross Domestic Production in 2002. Sri Lanka has successfully phased out a number of hazardous pesticides including all the WHO hazard Class 1 pesticides and persistent pesticides from usage. The currently recommended pesticides are less toxic and least persistent than the earlier pesticides. Safer alternatives are available for the spectrum of pests controlled by POP/PIC pesticides. The stocks of outdated pesticides are quite significant and hence disposal is a serious issue which needs immediate attention. Although persistent pesticides were prohibited from use in agriculture and from public health more than two decades ago, traces of some pesticides and its derivatives have been detected in some environmental compartments and this needs further investigation. There is limited information available on the residues of these chemicals in groundwater and surface water bodies, which are found in large numbers in agriculture areas. Awareness on pesticide related issues, concerns and required remedial measures are alarmingly poor among most of the sectors in the society.

As the regulatory authority responsible for proper management of pesticides in the country, Office of the Registrar of Pesticides has to depend on certification of product quality by the foreign manufacturer, but the authority is not adequately equipped to verify the claims. Cooperation received from the Customs Department in controlling illegal imports and pesticide industry in safe handling of pesticides, are very encouraging. However, certain improvements are needed in custom classification procedure to ensure prevention of possible imports through improper declarations. Incidences of pesticide related accidents are very high in Sri Lanka while most of the incidents are for suicidal intent. On the other hand, environmental damage due to pesticides has not been adequately studied.

Sri Lanka strongly advocates adoption of IPM technology to control pests, thereby, reducing the over dependence on pesticides. This in the long run helps to minimize pesticide-related hazards, in addition to ecological benefits.

Introduction

Country profile

The economy of Sri Lanka is mainly agriculture based. It has two sectors namely, domestic and plantation sector. The domestic sector, which forms the dominant part of agriculture, accounts for 1.7 million farm families in a population of around 19 million. Both sectors jointly contribute 20 percent to Gross Domestic Product (GDP) and 34 percent to employment (Central Bank Report, 2002). Compared with countries of South Asia, Sri Lanka has a high population density of 0.35 ha per person. Out of total land area of 6.5 million ha, only about 5.5 million ha are arable. Thus, it is vital that the production efficiency in agriculture sector be improved both in production and post harvest aspects.

In management of pests, the plantation sector approach in a more organized manner whereas, in the domestic sector it is more complicated due to large number of farmers, crops and the pests

involved. Agriculture is the biggest user of pesticides in Sri Lanka. The extents under different agricultural crops are given below; Rice (685 625 ha), Fruit crops (99 727 ha), Other agricultural crops (131 220 ha), and Plantation crops (694 674 ha) (AgStat, 2004).

Trends in pesticide use and trade

In Sri Lanka, the pest control is mostly dependent on the use of synthetic pesticides. Pesticides are imported to the country as ready-to-use products in handy packages, bulk formulations or technical materials for local formulations. By 2003 the CIF value of the country's pesticide requirement was 19.6 million US$ and of this 2.72 million US$ was allocated for the import of technical material for local formulation. Of this 16.78 million US$ was allowed for direct import of formulated products (Table 1).

Table 1. Foreign exchange spent for import of pesticides-2003

Item	Volume in Metric Tons	Value in US$ ('000)
Technical grade material for local formulation		
Insecticides	216.39	1 900.08
Weedicides	193.90	717.95
Fungicides	6.78	121.56
Formulated pesticides		
Insecticides	1 468.01	5 925.87
Weedicides	2 731.20	8 200.60
Fungicides	785.40	2 654.20
Others (acaricides, rodenticides, fumigants, molluscicides, insect repellents, etc.)	19.55	74.79
Total	**5 120.73**	**19 595.05**

Source: Pesticide Statistics for the Year 2003, Office of the Registrar of Pesticides.

At present, over 1 000 brand pesticide products are registered (approximately 55 insecticide active ingredients, 32 fungicide active ingredients and 30 weedicide active ingredients) which are marketed and/or handled by more than 120 private sector organizations. The continuous dependence on use of pesticides had brought a dramatic increase of imports since the enactment of the Pesticide Law in the country from 2 309 metric tons in 1980 to 5 120 metric tons in 2003. Total annual agricultural pesticide consumption was estimated as 1 696 metric tons of active ingredients at a cost of 49 million US$ in 2000 (Table 2).

According to FAO (1997), Sri Lanka ranks very high in the Asia Pacific Region with regard to pesticide related health hazards. Annually the total number of pesticide accidents in Sri Lanka is around 20 000 of which 1 600 are fatal with 70 percent of this being suicidal attempts.

Regulatory control measures

Prior to 1962, pesticides were more or less freely imported into the country. With the changing import policies in late 70's, pesticides were imported on open general licenses even including prohibited products such as DDT and endrin by unscrupulous traders. With the gradual involvement by the Department of Agriculture, recognizing the need to exercise control over the use of pesticides since early 60's, an effective regulatory mechanism was brought into action in 1983 through the Control of Pesticides Act No. 33 of 1980. It makes provisions to regulate the import,

Table 2. Pesticide consumption in Sri Lanka 1995-2000

Pesticide Category	Quantity of Active Ingredient (mt)					
	1995	1996	1997	1998	1999	2000
Insecticides						
Chlorinated hydrocarbons	48.30*	50.67**	45.86**	37.16**	12.44**	–
Organophophates	202.00	155.93	214.13	184.51	327.29	232.59
Carbamates	77.31	63.57	66.09	116.94	55.15	112.40
Pyrethroids	0.46	1.53	0.71	0.77	1.05	0.81
Botanical products and biologicals	–	–	–	0.0056	0.0079	0.0062
Insect growth regulators	0.27	0.27	0.83	2.76	2.23	2.55
Others	96.58	99.86	23.38	31.88	15.90	29.36
Total Insecticides	424.92	371.83	351.00	374.03	414.07	377.72
Herbicides						
Phenoxy hormone products	189.45	164.52	240.05	215.95	261.76	168.32
Triazines	0.82	0.54	0.56	0.31	0.45	0.56
Amides	443.72	402.20	391.88	341.48	313.23	302.72
Carbamates-Herbicides	–	–	21.49	–	13.79	–
Urea derivatives	31.62	20.10	36.70	23.06	20.82	23.03
Bipiridils	54.49	63.92	16.12	67.12	82.69	74.27
Others	95.13	121.36	157.94	186.05	239.95	313.54
Total Herbicides	815.23	772.64	864.74	833.97	932.69	882.44
Fungicides						
Inorganics	182.22	193.81	168.23	171.83	180.35	172.65
Dithiocarbamates	265.17	222.84	201.61	124.16	205.32	236.48
Benzimidazoles	4.92	3.84	5.54	5.85	8.20	7.82
Triazoles, Diazoles	–	–	1.53	0.27	2.70	1.57
Diazines, Morpholines	2.65	2.50	2.50	2.85	2.35	2.20
Others	40.52	86.05	25.00	19.22	21.13	14.76
Total Fungicides	495.48	509.49	404.41	324.18	420.05	435.48

Note: Pesticide classification is based on the "List of Major Plant Protection Products", FAO Statistics Division, Rome, Italy.

* Values are based on the consumption of chlordane and endosulfan.

** Values are based on the consumption of endosulfan only.

formulation, packing, labeling, storage, transport, sale and use of pesticides. Thus, it is evident that the law applies to all pesticides, whether the end use is in the fields of agriculture or public health, or whether the products are to be used in the household, veterinary or the industry.

The Registrar of Pesticides is the national authority for implementing the laws and regulations under the Control of Pesticides Act No. 33 of 1980 and hence conformation to international conventions in relation to pesticides such as POP, PIC, etc. which would be carried out as a routine measure. Pesticides Technical and Advisory Committee (PeTAC) is the statutory body comprising of 15 members with the representation of government agencies who gives advice on policy and technical matters to the Registrar of Pesticides. The Registrar of Pesticides is further assisted in formal and informal manner with expertise available in the Department of Agriculture and other government institutions (Figure 1). The basis of regulation is the compulsory registration of all pesticide material. The post registration activities are an inherent part of Sections 20-22 of the Control of Pesticides Act, which enables the regulatory process to safeguard food quality, human

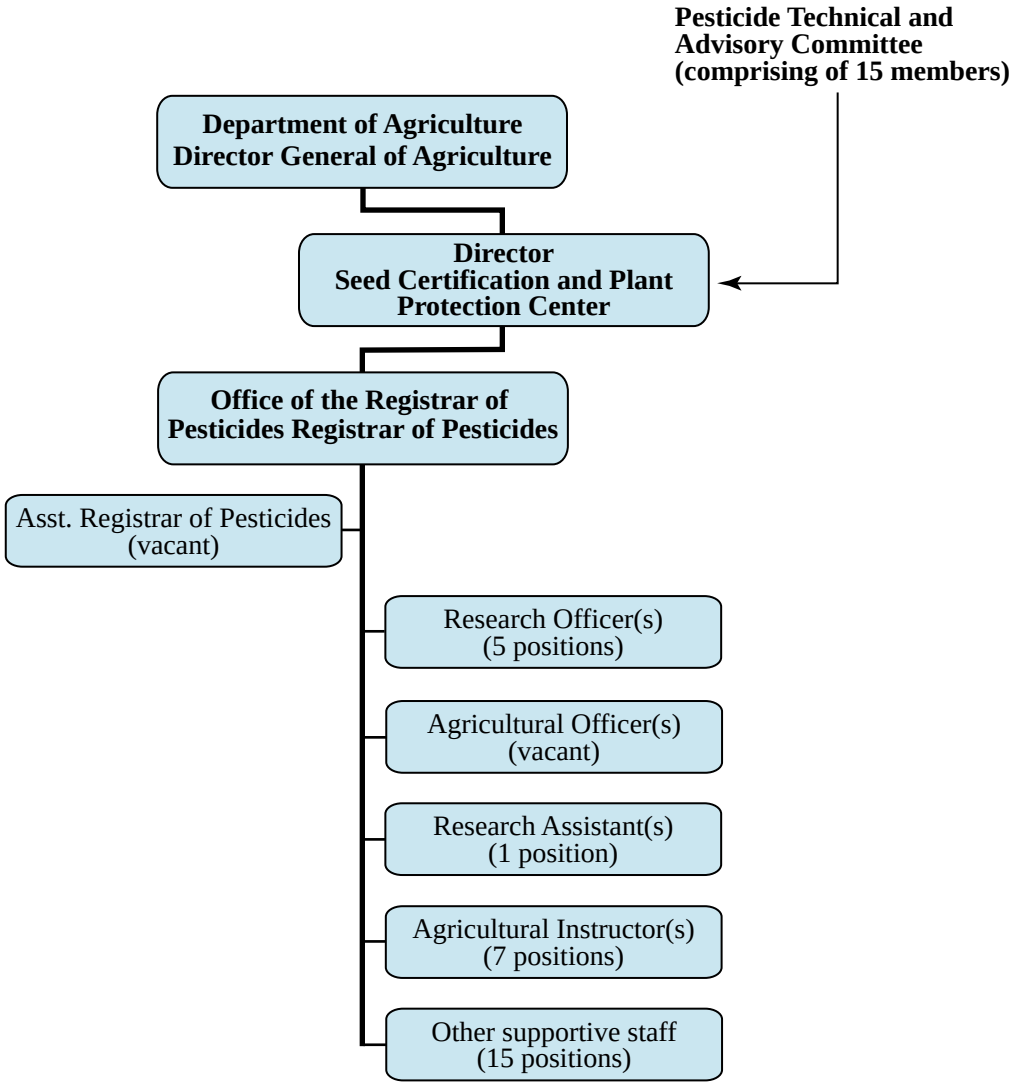


Figure 1. Administration structure and staff composition of the Office of the Registrar of Pesticides

health and the environment against pesticides. These activities would enable a full evaluation of risks associated with the use of pesticides in the field and to take necessary regulatory action.

No pesticide may be imported in to the country without registration and the appropriate licence authorizing importation of pesticides issued by the Registrar of Pesticides and only to registered importers. Processing of an import license is based on compulsory pre-registration, quality, source identification and regulatory policies with special consideration on banned and restricted pesticides. Legal provisions are provided by the Control of Pesticides (Amendment) Act No. 06 of 1994 for licensing of traders, appointment of authorized officers, specifying the functions and powers to seize pesticides in outlets conducting activities contrary to the legal provisions and regulations. All traders engaged in the storing, selling or offering for sale any pesticides are required to obtain a certification for sale from an Authorized Officer. As a mandatory requirement for the issuance of a licence, applicants for dealership are required to undergo one-day training on the principles of pesticides safety, identification of pesticides and awareness on the registration system conducted by the officers of the Office of the Registrar of Pesticides. Awareness and legal binding thus created would expect to minimize unscrupulous trade practices and thereby adverse impacts due to pesticides.

Sri Lanka has a national policy implemented in 1995 that no pesticide formulation of WHO hazard class Ia/Ib are marketed for regular pest control purposes in agriculture. Accordingly, some of the formulations of insecticides such as endosulfan, chlorpyrifos, carbosulfan, and quinalphos which are falling into the WHO hazard class Ib have been banned, which are considered to be the most dangerous with high acute toxicity and also the pesticides with longer persistence in the environments. To this second category falls the POP group of pesticides. All pesticides should be subjected to a comprehensive bio-efficacy testing procedure prior to submission of application for registration. The registration package should consist of original reports on all related chemical, physical, biological, toxicological and environmental data. For commodity products the reports are required from accredited laboratories with GLP compliance. No "me too" registrations are allowed thus registered products are constantly subjected to latest international developments either at the time of re-registration after every three years or as and when necessary. However, most of the implementation strategies are not up to expectations, due to the lack of resources like manpower, laboratory facilities, equipment, mobility, etc.

Import control

An established working mechanism exists where pesticides are concerned under the specific HS coding system. Should any pesticide be prohibited for import unless with forged declarations, there is no possibility that they would be infiltrated through the Customs who work closely with the Registrar of Pesticides in regulating pesticide imports.

A committee established under the Ministry of Science and Technology in March 2001 to implement the recommendations made by the Presidential Committee on "Chemicals Used in Agriculture, Health and Other Sectors" appointed a sub committee of which the Registrar of Pesticides was the convener, to create sub-headings in the Custom Tariff Guide under relevant HS Codes other than the ones already brought under license in order to identify all pesticides that are banned/restricted or registered for use in the country for regulatory purposes.

Sri Lanka is a member nation of the United Nations and has agreed to support the International Code of Conduct on the Distribution and Use of Pesticides, which outlines the overall responsibility of member governments in participation of the pesticide Industry to allocate high priority and adequate resources for pesticide management. Pesticide Association of Sri Lanka (Presently called as CropLife-Sri Lanka) was established in 1981 as an integrating body of pesticide traders in Sri Lanka. It integrates firms, companies, corporations and individuals in importation, distribution, formulation, and marketing of pesticides. The contribution shown by the Association towards the observance of the International Code of Conduct (FAO, 1990), especially in extending the message of safety in the use of pesticides is more convincing. Currently, self-monitoring in the areas of maintaining factory standards in pesticide formulation, re-packing and quality control of locally formulated pesticides is warranted. However, the challenge will be how to achieve compliance with local laws and regulations in an efficient way, which may involve working corporately with members, non-members, other state agencies and the pesticide regulatory authority.

A. Pest and pesticide management

Replacement of all persistent pesticides with other chemical alternatives in agriculture, public health vector control, industrial uses such as wood preservation and termite control have been successfully implemented in Sri Lanka. For persistent pesticides, the availability of safer alternatives has made them redundant in chemical pest control. In replacing the persistent pesticides, the alternatives were recommended on the basis of pests, not on the basis of the chemical, and hence in certain cases there were more than one pesticide available to cover the spectrum of pests.

Myths in the farming communities regarding chemical pest control, lack of proper awareness of pesticides and irresponsible promotion of products in the field by suppliers/dealers have contributed towards number of incorrect practices. Selection of chemicals for pest problems, timing, frequency and dosage of application are some of the most frequent indiscriminate uses carried out by farmers. This would result in poor yield, high input cost and low quality produce.

Therefore, farmers should be properly educated through comprehensive campaigns designed, based upon technical as well as socio-economic aspects of the farming community. Integrated Pest Management (IPM), the internationally acclaimed solution to indiscriminate use of pesticides, has been declared as one of the government policies in sustainable development of agriculture. The government of Sri Lanka has a long-standing commitment to IPM. In the policy statement (1994) of the President of Sri Lanka it was declared that "the dependency on chemical fertilizers and agro-chemicals will be progressively reduced through soil fertility improvement measures, adoption of integrated pest management and other agronomic practices".

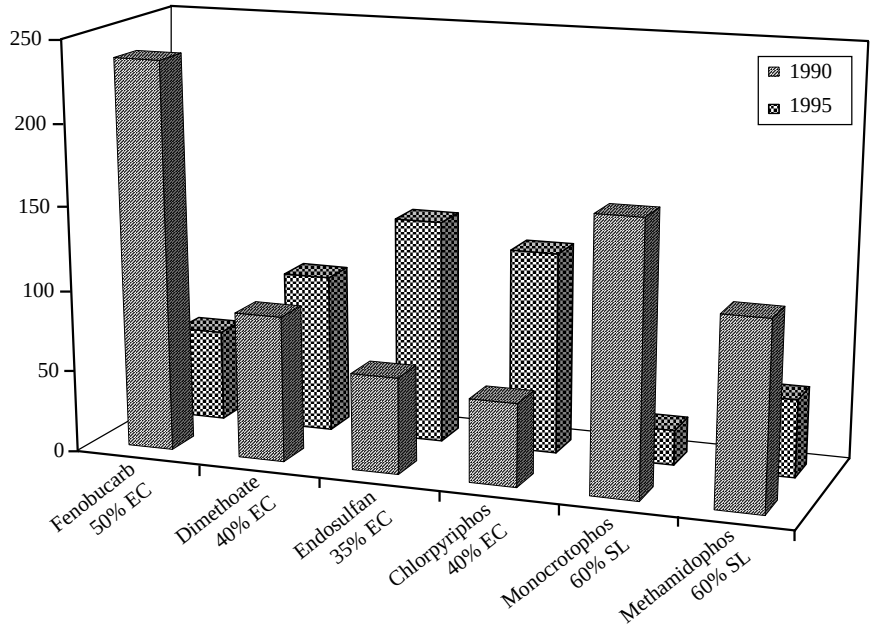
Successes of Integrated Pest Management

Sri Lanka has a very successful IPM program in rice spread all over the country, initially sponsored by FAO from 1984-2001. The success was made possible by right policy decisions of the governments with regard to pest management coupled with the availability of relevant technologies and institutional arrangements which has facilitated the efforts of control on pesticide use (Administration Report, Department of Agriculture, 2000, 2002).

The success of IPM program in rice over the last several years has resulted in the demand for IPM for other field crops as well. During 1996 yala season IPM was adopted for chili crop that consumes extremely high quantities of pesticides. The Farmer Field Schools (FFS) conducted with a group of chili farmers were able to change their attitudes on pesticide use and reduced the pesticide usage by about 75 percent (Administration Report, Department of Agriculture, 2000). This has motivated agriculture research for further studies on IPM for chili and other crops as well. Most farmers in the central region of the country were adopting rice/vegetable mixed cropping pattern with rice being the minor crop. Since these farmers seldom apply any insecticide on rice the positive gain by IPM was not evident. Unlike in rice, vegetable farmers apply large quantities of pesticides to their vegetable crops. The experience gained by them through rice/FFS on ecosystem analysis and identification of pests and their relationship with natural enemies have made a considerable change in their thinking about pesticide usage in the growing of vegetables. These preliminary observations confirmed that there is much scope for IPM in vegetable production. Expansion of IPM on vegetables is further explored by the Department of Agriculture with the technical backup given to the provincial extension service to conduct IPM demonstrations in farmer fields on tomato and leafy vegetables (Administration Report, Department of Agriculture, 2000).

It has been observed that if a promotional package is offered with alternatives to the use of pesticides such as IPM, we can anticipate a reduction in the use of pesticides or a deviation from the trend in chemical dependant pest control (Sumith, 2002). The significance reduction in the use of fenobucarb (BPMC) in 1995 compared to that of 1990 (Figure 2) may be a result of intensive rice IPM program conducted by the Department of Agriculture where fenobucarb is mainly used in rice Brown Plant Hopper (BPH) control.

The overall impact of IPM revealed that (1) Reduction in insecticide use: IPM farmers use an average of 0.48 insecticide applications against 2.27 applications by non-IPM farmers per season in all 8 provinces; (2) Yields: IPM farmers obtain 23 percent higher yields than non-IPM farmers on the average in the experimental fields; (3) Durability of FFS training: IPM farmers still continue to



(*Source:* Sumith, J.A. (2002). Pesticide Management in Sri Lanka: Implementation Issues and Past Experience. Economic Review: November/December 2002, p. 23-31.)

Figure 2. Annual consumption of insecticides (mt) in 1995 and 1990

use on an average less than 0.5 times insecticide applications/season for their crops even 5-8 seasons after training; (4) Community action: FFS training has strengthened group action thus motivating farmers to go back to traditional systems like "aththam" (mutual help) in labor intensive operations; (5) Farmers as leaders: FFS training has integrated farmers to become IPM trainers and take the responsibility of training other farmers in the village; and (6) Benefits: Obtain higher profits due to cost reduction plus increased yields; become experts in crop management; enjoy better health due to minimal exposure to hazardous chemicals (Hector Senarath, IPM National Expert, IPM/FAO Project, personal communication).

In the mean time, the national pesticide policies in Sri Lanka are also geared towards supporting IPM in crop production. Restriction of highly hazardous WHO class Ia/Ib pesticides only for certified applications, total banning of all class Ia/Ib pesticides from retail use, thorough and intensive screening at research level only the pesticides having narrow activity or less effects on natural enemies and pilot scale testing before registration, and promotion of bio-pesticides are some of the supportive roles given through the implementation of the Control of Pesticides Act.

In collaboration with the Health Ministry (Anti-Malaria Officers) and International Water Management Institute (IWMI), preliminary studies on integration of disease-vector management with community IPM in rice has been initiated by the Department of Agriculture. Integrated Vector Management (IVM) is used to designate an approach largely building on the same principle as IPM which is also a milestone in the success story of the IPM in Sri Lanka (Administration Report, Department of Agriculture, 2002).

Pesticide malpractices and resistance

Development of pest resistance has become a serious concern so much so that in anticipation of such, led the authorities to direct that use of new generation synthetic pyrethroids in particular be restricted. After reviewing the subject of use of synthetic pyrethroids based on IRRI (1976) and Elliot et al. (1978), strict control over crop as well as usage was exercised since 1995 and the present quota for each registrant permitted is 1 600 liters per annum.

The misconception that chemical pesticides are the lasting solution in eliminating pests and vectors of diseases has led to routine and injudicious use of pesticides. With pesticides becoming less effective, users tend to increase the dose and the number of pesticide applications or by making or changing to un-recommended products. The pest problem has further aggravated by the build-up of resistant populations and the loss of natural enemies of the target pests formerly associated with agricultural cropland. A classic example is the change in status of the leaf folder of rice which was the minor pest in the past (Nugaliyadde et al. 2001) due to unscrupulous spraying of broad spectrum insecticides in rice fields.

Misuse of pesticides

Apart from residue, health and environmental effects, indiscriminate use of pesticides causes several other very serious undesirable effects such as build up of pest resistance and resurgence etc., economic losses to the farmer, effects on the yields and sustainability in agriculture. Surveys have revealed that vegetable cultivators are generally not aware of good agricultural practices and normally apply more than the recommended dose of pesticides (Jayathilake and Bandara, 1988). Excessive use of pesticides has been reported to have long term adverse effects on the immediate environment. A survey on impact of agriculture on ground water quality carried out at Kalpitiya peninsula where onion is cultivated extensively has revealed significant levels of carbofuran and very high levels of nitrate fertilizers in groundwater (BGS, 1992).

An extensive environmental study conducted at Nuwara-Eliya by the Urban Development Authority has highlighted the following areas of misuse of pesticides. Due to high cost of analysis of environment compartments for pesticides, it was conducted mainly as a survey-typed study, and the conclusion was that the environmental pollution due to pesticides should be extremely high. Accordingly, a number of measures has been recommended to reduce pesticide use, considerably. According to this study, about 80 percent of farmers use pesticides not recommended for the particular crop indicating the extent of misuse.

Current action and policies are in effect to prevent the escalation of many undesirable effects that have resulted from the dependency on pesticides. These have been primarily technical, educative, and legislative. As is mentioned elsewhere, the Department of Agriculture's policy over the last several decades has been to phase out reliance on pesticides for food production by adoption of IPM technologies such as breeding for resistance, etc.

B. Testing, quality control and effects in the field

Residues in agricultural commodities

While unacceptable levels of residue in agricultural commodities directly affect the health of the consumers, it indirectly threatens the economy of the farmer at the domestic level and the nation at international level. Studies have shown that farmers in vegetable growing areas are generally not well aware of good agricultural practices and normally apply more than the recommended dose of pesticides. Excessive use of pesticides may produce long term adverse effects on the immediate environment. In addition, precautions like pre harvest intervals are often not followed thus causing potential residue problems. Apart from vegetables, indiscriminate use of pesticides in tea can cause residue problems and the consequent repercussions in international trade. Though Sri Lanka has been acclaimed as having the cleanest and best tea in the world with respect to pesticides, there were instances where pesticide residues have been detected in the exported consignments.

In Germany, a consignment of tea from Sri Lanka has been detected with traces of PCB isomers in mid 80's. Another study conducted by M.P. de Silva and W. Thiemann in 1991 has found detectable levels of DDT, cyclodienes and lindane in tea grown in up-country, though the use of these chemicals have been banned for almost two decades. It is speculated that the residues may have been originated at the cultivation stage of tea.

In 1993, a consignment of tea was detected with a pesticide identified as ethion that has never been used in Sri Lanka in the recent past. One of the possibilities was a cross contamination during blending of teas imported from other countries by the traders.

Recently, methyl bromide traces have been detected in tea, probably by using shipping containers treated with methyl bromide before the re-entry period. Tea being the main foreign exchange earning crop of the country with around 15 percent of the total earnings, it is imperative that the highest quality is ensured of the product in order to safeguard the market and be competitive in the international trade. The Tea Research Institute, which has the mandate for research and development of tea in Sri Lanka, is extremely careful when recommending pesticides. Information based on local and international research is paid due attention to maintain the required standards up to the production level. However, possibilities of supply of sub standard pesticides to the plantation sector, sources of pesticide contamination beyond the production level needs regular monitoring by the pesticide regulatory authority, in order to decide any additional control measures should be enforced through regulatory system.

Barriers to high profit export market for vegetables

According to the data available for the early months of the year 2002, average profit margin for potato in the local market is around 100 percent, a crop considered as one of the most unprofitable due to the effluxion of potatoes to the country during past several years. In the case of rice, the profit has been ranging from 2 percent to 33 percent during different seasons. The sector would soon become economically unattractive due to rapidly changing local as well as international trade practices. A possible solution to overcome such economic drawbacks is to access the highly profitable export market.

Currently, exports of vegetables to the West and other developed countries are minimal. Pesticide residue is one of the main factors that hinder those economically sound options available for farmers. An indication of the extent of pesticide residues in agricultural commodities is the detection of significant levels in exported consignments, the only sector where any test on pesticide residues are carried-out on locally grown crops. For example, alpha and beta-endosulfan and endosulfan sulphate have been detected in chilli powder exported to Netherlands thrice in 1997 indicating the consistency of the problem (The product endosulfan is now banned in Sri Lanka). Export of gherkin was considered as a highly profitable market in the early 90's. However, only very few enterprises were able to be sustained in the business mainly due to difficulties in compliance with stringent pesticide residue requirements in the importing countries. Maintenance of high quality standards of agricultural produces conforming to the international levels is vital for such ventures. Thus, the farmers in Sri Lanka are currently deprived of their true potential. A proper management system has to be formulated based upon local pesticide residue data, with respect to actual farmer practices in the field.

High pesticide residue levels in the local diet

Public concern over pesticide residues in vegetables and fruits has been increasing during the past years. The risk of human health from pesticide residues is due to the pesticide residues in the

edible part of crops and the daily consumption of crops. Although, persistent products are screened out during registration and pre-harvest intervals are given accordingly for the recommended crops in the label, the common farmer practice of applying pesticides close to harvest and sometimes even after harvesting for protection during transport and marketing do raise concerns of high levels of residues in foods.

There are no comprehensive studies done in the recent past to assess the residue levels in vegetables and fruits. Although, organochlorine insecticides such as aldrin, DDT, dieldrin, endrin, HCH, heptachlor, and lindane have been phased-out from use in Sri Lanka, at least since two decades ago, their residues may still remain in the environment. A survey of organochlorine insecticide residues conducted in 1979 has revealed traces of residues in vegetables as well as in soil and water. As some of those chemicals are potential carcinogens, presence of traces in the environment poses serious threat to human health. However, a limited study conducted by the Office of the Registrar of Pesticides in 2000 for few vegetable and fruit samples collected from the market (imported fruits such as grapes and pear samples with known origin obtained at the entry of point were also included) confirmed that the residues in tested samples contained within the acceptable levels for pesticides which included organophosphates, carbamates, organochlorines and carcinogens.

Unfortunately, there is no program currently in place in the country to conduct continuous monitoring of residues, due to lack of required laboratory facilities. Regulatory authorities have the necessary mandates for establishment of Maximum Residue Limits (MRL) for crops with respect to pesticides registered in the country. It enables to determine the Pre-Harvest Intervals (PHI) for pesticides given in the label for the farmers to follow, thus maintaining residue in acceptable levels. These vital parameters have to be developed under local conditions as the behavior of pesticides in the environment is greatly dependent on local environmental conditions and human intake of such residues further depended upon the cooking and eating habits of the society.

Toxic by-products and impurities

Apart from the inherent toxicity of pesticidal substances, the hazard of the final marketed product is greatly dependent upon the impurities as well as nature and quality of the other ingredients incorporated in the preparation. In spite of assurance of quality through registration procedure, which mainly focuses on the literature of the product, there were number of occasions where inferior quality has been reported in products offered to the farmer. It is believed that a large number of such incidents are not reported due to lack of proper investigation and recording system in every related discipline. Ethylene thiourea (ETU), an impurity in one of the most extensively used class of fungicides, is a potential carcinogen. Under careful controlled manufacturing procedures, the level of this very dangerous substance can be maintained below the harmful level. Since this class of fungicides has become a commodity in the international market, there are number of manufacturers and some may not be capable of always confirming to the required standards. There are several similar situations exist in this field. Thus, it is vital that routing testing of quality standards is carried out by the regulatory authorities for such products to ensure the safety.

Another field survey conducted by the Office of the Registrar of Pesticides in collaboration with the University of Professional Education, Netherlands reports that a large extent of land has been abandoned at Matale as vegetables are not grown any longer due to extensive use of pesticides and fertilizer in the past. The real environmental impact has yet to be properly studied. A survey on impact of agriculture on ground water quality carried out at Kalpitiya peninsula, where onion is cultivated extensively has revealed significant levels of carbofuran and very high levels of nitrate fertilizer in ground water.

These studies clearly indicate the extent of the problem with respect to pesticides in Sri Lanka. However, an exact account of the extent of environmental pollution due to pesticides is far from the reality due to severe shortage of field data. Thus, it is essential that a comprehensive program should be drawn-up to address the issues individually and effectively and implemented immediately to safeguard the people and the environment.

C. Health and environmental information

Pesticides are known to have the potential to cause irreversible and debilitating damage on the ecosystem and species populations, including humans. There are serious concerns among the international scientific community on adverse human health and wildlife effects due to specific group of chemicals known as "Endocrine Disruptors" (Colborn, et al., 1996; EDSTAC, 1998). Among the suspected EDs, there are number of compounds classified under the Stockholm Convention which have been used widely in the past in Sri Lanka and some are non-persistent pesticides are still widely used in the country (i.e. mancozeb, malathion, carbaryl, chlorpyrifos, dimethoate) (Sumith, 2001). The indirect toxic effects of these pesticides on wildlife and birds have been studied in detail through field studies in other countries.

Although some data are available concerning the concentration of limited number of pesticides in surface waters, river waters, etc. in Sri Lanka (BGS, 1992; Silva, et al., 1991) little or no information is available concerning the biological significance. Isolated incidences of pesticide related deaths of fish populations, snakes, etc. have been reported in surface waters following heavy application of mostly organophosphate and carbamate type of pesticides in agricultural fields without possible long-term environmental damages. Also, scattered incidences are reported to the Office of the Registrar of Pesticides on deaths of peacocks and other birds due to the consumption of rice grains treated with insecticides.

Accidents and occupational exposure

The acute pesticide poisoning effects often resulted in mortality are easily noticeable from sub-lethal effects which require exposure to pesticides for a longer period of time. Though it is likely to be prevalent, long-term effects are either not diagnosed properly in some cases or difficult to establish the actual causative agent under the conditions prevailing in Sri Lanka. Since all persistent pesticides are banned for more than a decade, any observable effects due to persistent pesticides should have been associated with long-term sub lethal exposure from contaminated environmental compartments and food chains. Such effects are most often not studied to identify or associate with the cause though it is widely believed that cases of chronic health problems such as carcinogenicity and reproductive effects are rapidly increasing. Thus the real effects of persistent pesticides are often underestimated.

Easy accessibility and irresponsible handling of pesticides have contributed to a greater extent aggravating to this situation. But, on the other hand, the accidents and occupational exposure are far less reported than anticipated when compared to the suicide statistics, mainly because of the differential administrative approaches in case of poisoning and comparatively low mortality rate in accidents. Senanayake *et al.* conducted research on the neurotoxic effect of organophosphorus insecticides, and observed secondary effects, which have not been recorded earlier. Women and children are often the victims of pesticide related accidents, especially in the farming communities. Effective awareness campaigns, focused at different target groups through proper modes of communications, are essential to protect those vulnerable sections of the society. Scarcity of such reports greatly handicapped making necessary policy and regulatory measures to ensure human safety.

Poisonings in occupationally exposed persons are usually associated with contract spray operator groups or farmers carrying out prolonged spray operations under hot humid conditions, without adequate personal protection. Recent poisoning data revealed >80 percent of poisonings caused by pesticides to be due to willful ingestion of pesticides for self-harm (Ref. Police Data on Suicides, 1998; Annual Poisoning Reports 1990-1996, National Poison Information Center). In 1979, out of all pesticide poisonings recorded, 73 percent were suicidal attempts with unintentional poisonings accounted for occupational exposure and accidental exposure incidences reported to be 16 percent and 7 percent, respectively (Jeyaratnam, et al., 1982). Though the use of highly hazardous pesticide formulations (WHO hazard class Ib), such as monocrotophos 60 percent SL, methamidophos 60 percent SL, endosulfan 35 percent EC, carbosulfan 20 percent EC, etc., have been restricted or banned, poisoning was considered severe based on percentage of persons affected and recurrent of episodes.

Many examples worldwide have shown that restricting the availability of toxic pesticides can reduce death rates from self-harm. WHO has suggested that death rates could be reduced by restricting the availability of poisons commonly used for self-harm (WHO, 2001). For example, a national ban on the organophosphate parathion reduced the total number of deaths reported to a poison center in Rosario, Argentina during the 1990s. (Piola *et al.,* 2001) As shown in the Table 3, it is possible to speculate that while the total deaths due to pesticides from 1983 through 1990 remains more or less stable, the death caused by organochlorines became gradually decreased, basically due to the restrictions and banning of some of the organochlorine candidates during that specified period.

A case study conducted at the Anuradhapura hospital showed that due to recent ban of endosulfan products (35 percent EC formulations of WHO hazard class Ib) in Sri Lanka (the last member of organochlorine pesticide) in 1998, the number of deaths of endosulfan poisoning fell quickly from 50 in 1998 to 3 in 2001 along with a fall in the total number of pesticide deaths (Roberts et al., 2003). The overall reduction on total death rates amidst the rising incidence of self-poisoning due to pesticides from 1998 through 2001 (Table 4) would have been due to displacement of a poisoning candidate (viz. endosulfan) which has a higher Case Fatality Rate (CFR) (42 percent) than that of common organophosphates (29 percent) concluded the beneficial impacts of pesticide regulation on deaths from poisoning in Sri Lanka (Roberts et al., 2003).

Table 3. Total pesticide poisoning episodes during 1983-1990

Pesticide Category	1983	1984	1985	1986	1988	1989	1990
Organochlorines	269	319	105	170	95	88	94
Organophosphates/Carbamates	900	931	1 052	1 022	1 190	987	1 069
Other Pesticides	352	209	282	260	239	–	–
Total	**1 521**	**1 459**	**1 439**	**1 452**	**1 524**	**–**	**–**

Source: Ministry of Health Statistics Division Personal Communication, Prof. Ravindra Fernando, University of Colombo, Department of Forensic Medicine, Colombo.

Table 4. Total pesticide poisoning episodes during 1996-2002

Category	1996	1997	1998	1999	2000	2001	2002
Admissions	21 129	19 286	21 429	19 996	20 326	19 081	17 364
Deaths	1 852	2 121	2 250	1 847	1 843	1 717	1 437

Source: Annual Poisoning Data, National Poison Information Center, Colombo.

Field studies revealed that 805 farmers suffered from symptoms of acute poisoning following spray sessions. However, only 20 percent underwent hospital admissions on occupational exposure (Environment Action Plan Report, 2002). Concerns of chronic health effects associated with pesticide residues in food and water sources are becoming more and more intensified with frequent reports of life threatening cases such as Chronic Renal Failure in Padaviya and Madawachchiya (Palitha Bandara, personal communication) and ever increasing numbers of cancer patients. The farming communities whose rely on agro-wells in intensively cultivated areas for their basic needs such as for drinking and washing purposes are at particular risk of pesticide residues.

Deficiencies in health related information collection and recording, prevalent in the system, has very seriously effected the formulation of effective control strategies for proper management of pesticides in the field.

Contaminated sites and environmental effects

Contaminated sites are identified as having a history of heavy previous use or locations where pesticides are transported into and deposited on those sites. Though a somewhat complete picture on available stockpiles can be drawn, which is estimated to be 166 metric tons, the situation on contaminated sites with regard to POP pesticides is obscure. DDT and subsequently BHC had been used for malaria vector control programs as a household residual insecticide; door-to-door application in malaria-infested areas in the Dry Zone (Herath, 1984) and in the Wet Zone including some areas of the Colombo district (Dr. R.R.M.L.R. Siyambalagoda, Director, Anti Malaria Campaign-personal communication). Agricultural uses were basically on coconut plantations, tea plantations, horticultural projects and tobacco nurseries. However, area specific potential contamination (non-point pollution sources) could be predicted for aldrin, chlordane, DDT, dieldrin and heptachlor for which there were specific agricultural uses in plantations, horticultural nurseries, non-food crops (e.g. tobacco) and in non-agricultural termite control uses.

Although DDT was totally banned as early as 1976, its precursors and derivatives could be present in the environment for a long period of time and thus could contaminate agricultural produces. In tea, DDT isomers could have been originated from heavy use of dicofol in the past which could be contaminated with DDT isomers depending on the production process adopted in manufacturing dicofol. Due to this reason, the use of dicofol in tea commenced in 1965 was prohibited in 1994. The total consumption of 42 percent dicofol (Kelthane) emulsifiable concentrate formulation was 2 084 liters from 1988-1992. A large number of estates in Uva, upcountry and mid country experienced heavy mite infestations during dry weather periods necessitating repeated use of miticides (Vitharana, 2003). Therefore, the detection of these pesticides in the environment may be due to agricultural run-off and excessive use or misuse in the past.

There is no planned monitoring system or infrastructure facility available with the pesticide registration authority to trigger remedial actions to mitigate the problems. So far no proper monitoring studies have been carried out on pesticides. Further, there is no surveillance system in place in the health sector to monitor the trends of health effects with respect to exposure to pesticides from environmental contamination. The data available in environmental concentrations are primarily produced for academic interests or data generated for export of agricultural commodities as a requirement from importing countries (residue levels) rather than for environmental or long-term monitoring purposes. This leads to rather discrete data coverage (spatial and temporal) which makes it difficult to evaluate significant trends of contamination by persistent pesticides in the country.

Limited data available from a study conducted in 1999-2000 (Industrial Technology Institute) revealed the presence of some DDT residues in the form of p,p'-DDE at 2-5 μg/kg in bottom

sediments in Hambantota coastal zone and up to 9.6 µg/kg of DDTs in sediments of Colombo port, though DDT was not in use in Sri Lanka for more than 30 years. The presence of DDT in the form of p,p'-DDE in almost all samples (6) in Hambantota coastal zone and though it is as high as 40-100 µg/kg in Beira Lake in Colombo (ITI, 2004), suggests the general absence of recent DDT sources in those areas. A similar trend have been observed by Guruge and Tanabe (2001) that >70 percent of total DDTs in sediments sampled from Negombo Lagoon, Chilaw Lagoon, Udappuwa and Mundal Lake were in the form of p,p'-DDE where they have concluded as insignificant local usage in recent times. However, the question on recent DDT sources remains active by the detection of DDT in the Colombo Port as reported elsewhere (ITI, 2000) in the form of p,p'-DDT and DDD in one out of 18 samples. More strikingly, the reason for the high p,p'-DDT concentration in Rabbit Fish (p,p'-DDT:ΣDDT was 74:120) from the Colombo Dockyard was also unknown (Guruge and Tanabe, 2001). More data is needed to make a reasonable scientific judgment whether it was due to inland sources or due to other transport mechanism of persistent substances.

Very little information is available on the concentration of chlordane in the environmental compartments despite the fact that chlordane has been used in Sri Lanka until recently compared to other persistent pesticides which have been banned long ago. Studies conducted by Guruge and Tanabe (2001) confirmed possible recent usage of chlordane in Sri Lanka by observing similar trend in ratio of trans-chlordane in biological samples and sediments to that of technical chlordane. Also, the total chlordane concentration in the Kelani River was found to be higher than those concentrations reported from most developing Asian countries, reasoning for possible recent usage of chlordane in the up-stream areas of Kelani River (Guruge and Tanabe, 2001). There are few citations on the presence of several persistent pesticides in vegetables, processed products and export products, particularly DDT, dieldrin and heptachlor. Available recent data is so limited about their environmental concentrations. The probable reason may be that most of these pesticides are either not formulated or not used in Sri Lanka and even it used not in large quantities or banned long time ago thereby diluting their levels in the environment quite considerably with time.

As discussed above, some of the organochlorine concentrations are still found in some environmental compartments, coupled with the lack of knowledge on the true picture of toxicological impact of persistent pesticides in the environment and human health point of view, the situation would have to be seriously dealt with to achieve environment and human health protection goals. In this context, further research, monitoring and environment protection procedures are critically needed in Sri Lanka.

Conclusion

Recurring problems encountered by the Office of the Registrar of Pesticides are often related to (a) the reliability of data submitted for registration; (b) the reliability of quality certificates for commodity products; (c) adulteration at field level; and (d) re-labeling of outdated pesticides. In-house product quality testing programs are not in place due to manpower development in the field of pesticide quality and residue analysis. The registration authority is therefore unable to check imported consignments with sufficient coverage and has to depend on Quality Certificates submitted by the basic manufacturer or formulator of the exported commodity products. In spite of assurance of quality through registration procedure, which mainly focuses on the literature of the product, there were number of occasions where inferior quality has been reported in products offered to the farmer. It is believed that a large number of such incidences are not reported due to lack of proper investigations and recording systems in every related discipline. In the case of commodity products from doubtful sources, as a means of cross checking their Quality Certificates, the services of independent testing laboratories have been employed. Irrespective of the presence or not of

regulatory systems in individual countries, it appeared that the maintenance of quality of pesticide products is becoming a challenge. Thus, it is vital to strengthen the analytical capabilities at the regulatory authorities so that routine testing of quality standards are carried out for commodity products to ensure the safety.

While the services of independent laboratories can be utilized for basic product related data generation and for other specific testing programs with respect to pesticide registration compliance, surveillance on enforcement activities and internal verifications in pesticide management activities are essential and is a necessary mandate of the regulatory authority. Therefore, it should be considered as an urgent need to strengthen relevant capacities at the Office of the Registrar of Pesticides, for this purpose.

As a social and environmental security measure, regardless of whether and how pesticides affects human and wildlife (where a highly organized scientific investigation is required for assessing the risks of pesticides in the areas of human health and environmental effects), it is an important aspect to assess human health and the environment against anticipated toxic effects highlighted through various epidemiological and other studies. Therefore, monitoring and surveillance of pesticides in environmental compartments are a necessary for the protection of health of human beings, wildlife and the environment.

Some of the priority areas identified for effective and efficient management of pesticides in the country are as follows.

1. Disposal of existing stocks of outdated pesticides.
2. Development of infrastructure at Office of the Registrar of Pesticides and Customs for compliance monitoring programs with respect to contamination/adulteration of pesticides.
3. Surveillance on environment compartments (air, sediments, water, soil, biological) and food products for presence of pesticides, including:
    - Assessment of pesticides residues for ground and surface water bodies.
    - Further investigation on the presence of persistent pesticide residues in coastal seabed.
    - Study of all pesticides recommended for agriculture on the fate and effects in the environment under the local conditions to ascertain any relevance to persistent qualities.
    - Establishment of MRLs for Sri Lanka and devising methods to minimize the residue levels in agricultural commodities.
    - Establish regular pesticide residue monitoring programs on food (local and imported) by strengthening the relevant aspects under the Law.
4. Surveillance on adverse effects of pesticides on the environment and human health under the local conditions by:
    - Establishment of a proper surveillance and reporting system (social and scientific) within the health sector on chronic health effects from exposure to pesticides.
    - Establishment of complimentary analytical programs to study the fate of such pesticides in the environmental compartments for the establishment of correlations between presence and their health effects.
5. Development of a coordinating system by establishing a network among the health, agriculture, industry and environmental sector research groups through the Office of the

Registrar of Pesticides as the focal point for coordination, information collection and sharing and policy decisions for prevention of pesticide related adverse effects.

6. Awareness on relevant responsibilities and issues for all stakeholders in pesticide management.
7. Public awareness campaigns and programs through printed and electronic media in order to achieve the necessary levels of awareness on pesticides.

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QUESTIONNAIRE SUMMARY

Sri Lanka

Selected Country Statistics:

Agricultural Population	**8.6 million**	**Agricultural Land:**	**1.9 million ha**
GDP $18 514 million	Agric. GDP: 20.1%	GNI per capita: $930	Hunger: 22%
FAOSTAT Pesticide Data	Export $0.45 million	Import: $20.8 million	Use:

GDP = Gross Domestic Product; GNI = Gross National Income; Hunger = Population below minimum energy requirement; FAOSTAT = latest data entry between 1998 and 2002

Institutional Profile

Ministry	**Legislation**	**Registration**	**Licensing**	**Enforcement**	**Testing**	**Training**	**Monitoring**	
							Environm.	**Health**
Agriculture	ORP	ORP	ORP	ORP	ORP	ORP	ORP	ORP
Environment								
Health								
Other					Res. Inst.			

Industry Associations: CropLife Sri Lanka
Non-Governmental Associations: VIKALPANI Fed., Center for Environmental Justice

A. Pest and Pesticide Management	
IPM policy declared?	**Yes**
IPM mentioned in…	
Crop Protection Policy?	**Yes**
Agric. Sector Policy?	**Yes**
Other laws/documents?	**?**
National IPM Program?	**Yes**
Dept: **PPS**	
IPM extension projects?	**Yes**
IPM research projects?	**Yes**
Pest resistance problems?	**Yes**

B. Testing, Quality Control and Effects	
Laws for pesticide specifications?	**Yes**
Low quality products in market?	**Yes**
Quality control laboratory?	**Yes**
Own analyses in 2004: **54**	
Outside analyses in 2004: **15**	

C. Health and Environmental Information	
Data on pesticide poisoning cases?	**Yes**
Total (1996): **21 129**	
occupational exposure cases: **2.5%**	
accidental exposure cases: **12%**	
intentional/suicide cases: **80%**	
Pesticide poison facilities?	**Yes**
Number of facilities:	
Poison Information and Control Centers?	**Yes**
Number of centers: **1**	
Significant environmental contamination?	**Yes**
Data on effects on wildlife & ecosystems?	**--**
Pesticide residue monitoring system?	**Yes**
Number of analyses 2004: **98**	

D. Pesticide Manufacture, Use and Trade		
Pesticide Volume	*Tons*	*$'000 Value*
Imports	**4 985**	**19 520**
Manufacture		
Exports		
Sales	**6 304** (formulated)	**49 000**
Pesticide Use Profile	*Tons*	*$'000 Value*
Agriculture (total)	**6 329**	
Insecticides	40%	
Fungicides	12%	
Herbicides	48%	
Other	0.3%	
Veterinary		
Public Health		
Household		
Other		
TOTAL		

E. Selected Standards of Code of Conduct	
Illegal trade estimates?	--
Estimated amount 2004	
Collection of old containers and pesticides?	--
Inventory of outdated/obsolete products?	**Yes**
Operational pesticide registration system?	**Yes**
Violations in 2004	
Existing facility licensing system?	--
Inspections in 2004	
Highly toxic products restricted?`	**Yes**

Questionnaire responses: Yes = Yes; -- = No; ? = don't know; (blank) = no answer

THAILAND

by Panpimon Chunyanuwat

Introduction

Pesticides are regulated by the Hazardous Substances Act B.E. 2535 (1992). Under this Act, the Hazardous Substances Committee (HSC) has been set up as the legal body to control pesticides. HSC assigned the

- Department of Agriculture (DOA) to be responsible for regulation of pesticide used in crop production;
- Department of Livestock Development (DLD) to be responsible for regulation of pesticide used in livestock production;
- Department of Fisheries (DOF) to be responsible for regulation of pesticide used in fish culture;
- Food and Drug Administration (FDA), Ministry of Public Health to be responsible for pesticides used as household chemicals.

Ministerial Regulations, Ministerial Notifications, Department Notifications and Department Rules were issued in order to facilitate implementation of the Act.

HSC also appointed Sub-Committees for registration of pesticide under each responsible agency. These Sub-Committees also appointed Working Groups (WG) to be responsible for operation of pesticide registration and regulation. Sub-Committees for Registration of Pesticide under responsibility of DOA appointed WG for:

- Consideration of Pesticide Labels
- Consideration of Toxicological Data of Pesticides
- Consideration of Experimental Designs and Efficacy Results
- Consideration of Biochemical Pesticides Registration
- Consideration of Microbial Pesticides Registration
- Pesticide Surveillance and Evaluation

In addition, the Division of Agricultural Regulatory Inspection has been assigned to monitor pesticide quality used in agriculture throughout the country.

A. Pest and pesticide management

Integrated Pest Management (IPM) has been put in the nation social and economic development plan since the seventh plan until present (starting from B.E. 2540 [1997]). IPM as well as good agricultural practice (GAP) is the main activity in the Food Safety Programme set by Ministry of Agriculture and Co-operatives starting from B.E. 2547 (2004). IPM is a collaborative project of the Department of Agriculture, Department of Agricultural Extension (DOAE), the Royal Project and DANIDA. It has been implemented on fruit crops and vegetables in northern, eastern

and central regions of Thailand where pesticide is used intensively. This project applied IPM approach in training courses for farmers in Farmer Field Schools in the mentioned regions.

The main constraint is consumer's attitude towards crop performance. Consumers prefer good looking or undestroyed crop products. Therefore it is needed to educate consumer to change their attitudes to safe crop products that do not look so good. It is also needed to train more farmers on IPM through Farmer Field Schools, put up public relations to convince consumers and promote bio-control.

B. Testing, quality control and effects in the field

Registration of a pesticide shall be granted when efficacy test result, label, toxicological data and analytical result are approved. It is required that pesticide samples shall be imported for efficacy test and for analysis of active ingredient and other constituents according to FAO specification of each pesticide.

Office of Plant Protection Research and Development is responsible for efficacy test of pesticide in the field. This agency shall approve experimental design, supervise efficacy test and approve efficacy test result. This Office also approves rate and method of application.

Division of Agricultural Regulatory Inspection, Office of Agricultural Regulatory, monitors pesticide quality by taking samples from the markets and at ports of entry. The analysis of these samples is done by laboratory at Office of Agricultural Production Science Research and Development. The percentage of active ingredient must conform to the percentage proposed for registration. In the year 2004, Office of Agricultural Production Science Research and Development reported that 1 316 samples were analyzed and found that 1 195 samples (90.81 percent) met the standard while 121 samples (9.19 percent) were substandard. The industry supports samples, methods and standards for analysis of pesticides for quality monitoring.

For new pesticides, it is required to conduct residue trial under supervision of Office of Agricultural Production Science Research and Development. Pre-harvest interval (PHI) and maximum residue limit (MRL) shall be determined by this trial.

C. Health and environment information

Health information

Bureau of Epidemiology, Department of Disease Control, Ministry of Public Health, in the Annual Epidemiological Surveillance Report 2003, showed that during 1994-2003 the highest number of poisoning incidents occurred in 1998 which were 4 398 cases and rate of cases per 100 000 capita was 7.16 (Figure 1). The rate of cases per 100 000 capita decreased since 1994 until 2003.

In 2003, the number of poisoning incidents was 2 342 cases or 3.72 per 100 000 capita. The poisoning incidents occurred in a rather high number during months of May-August (Figure 2). The northern region was reported to have the highest number of poisoning incidents followed by north-eastern, central and southern regions, respectively (Figure 3). The age that has the highest poisoning incidents was more than 35 years old followed by 25-34 and 15-24 years old, respectively (Figure 4). Farmers were report to have the highest number of poisoning incidents which was 64.86 percent followed by labor workers (Figure 5).

According to Bureau of Occupational and Environmental Disease, the nation-wide screening of people in agricultural sector, using reactive paper test showed that the percentage of population at risk of organophosphates and carbamates (having cholinesterase in blood lower than 75.0 unit/ml) increase continuously from 15.96 percent in 1997 to 29.41 percent in 2002 (Figure 6). The morbidity and death rates due to pesticide poisoning during 1997-2003 were 0.34-1.03 percent. The result of blood screening tests suggests that high exposure of farmers to pesticides is a concerned problem although the health effect severity is not up to acute poisoning case or death.

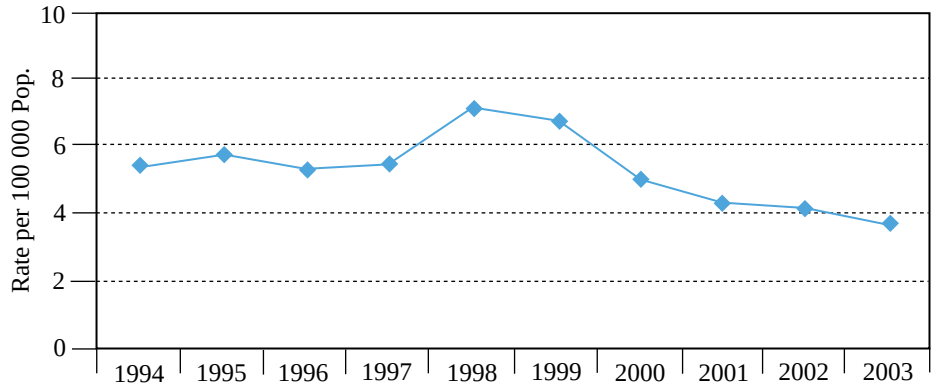


Figure 1. Reported Cases of Pesticide poisoning per 100 000 Population, by Yera, Thailand, 1994-2003

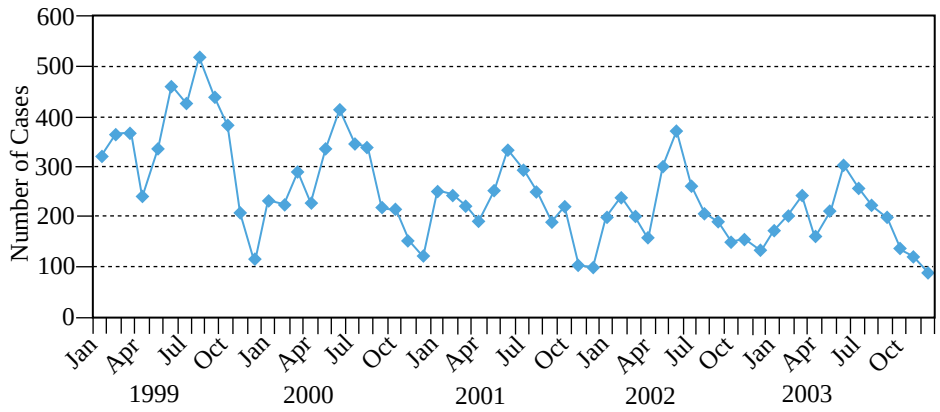


Figure 2. Reported Cases of Pesticide poisoning by Month Thailand, 1999-2003

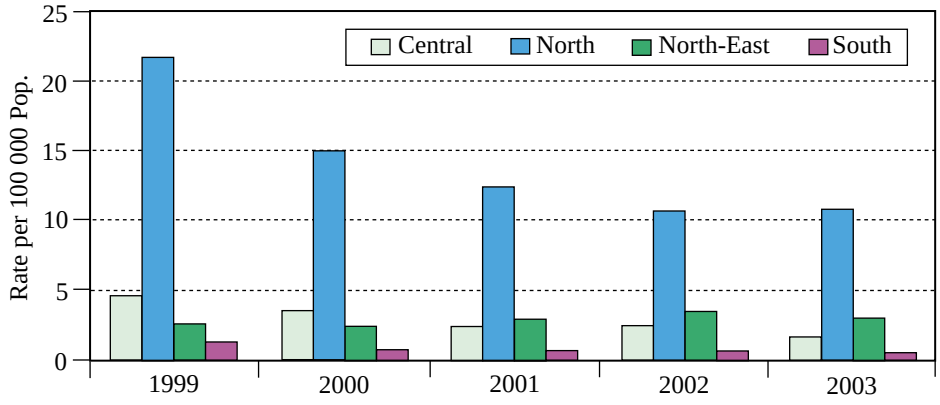


Figure 3. Reported Cases of Pesticide poisoning per 100 000 Population, by Region, Thailand, 1999-2003

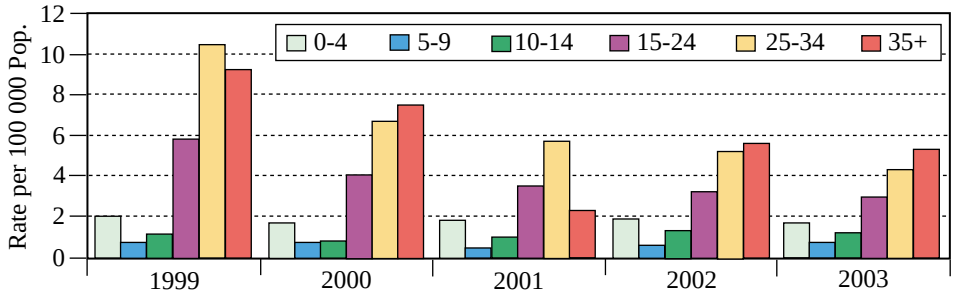


Figure 4. Reported Cases of Pesticide poisoning per 100 000 Population, by Age-Group, Thailand, 1999-2003

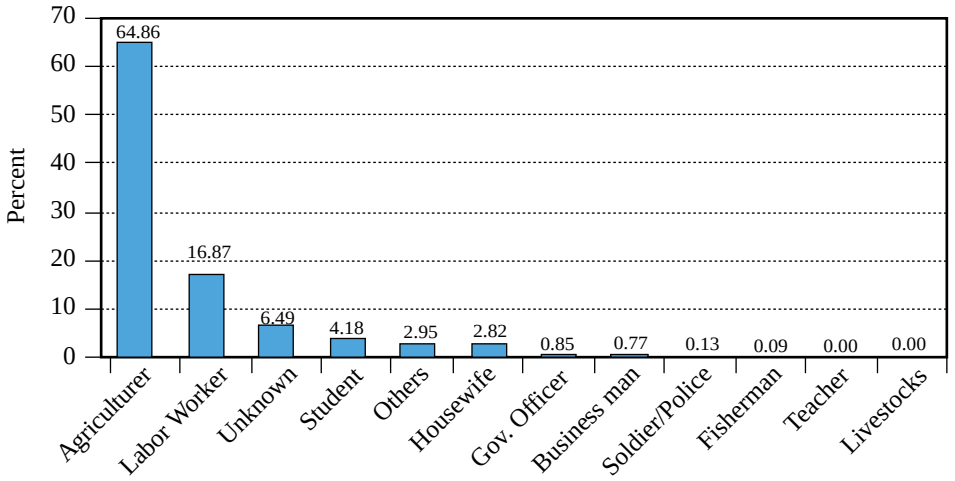


Figure 5. Proportion (%) of Pesticide poisoning by Occupation, Thailand, 2003

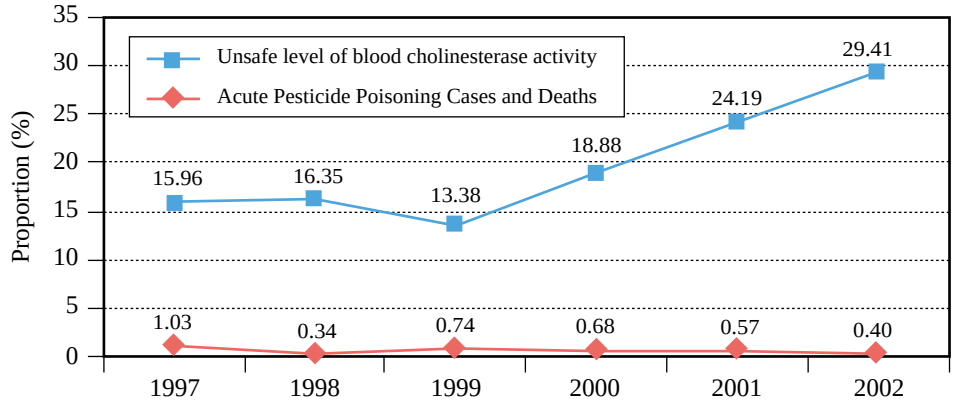


Figure 6. Proportion of agriculturers having unsafe blood chlorinesterase level and epidemiological statistics of acute poisoning cases and deaths during 1997-2002

The Department of Agriculture in collaboration with Department of Agricultural Extension, Thai Agri-Business Association and Thai Crop Protection Association arranged training courses on safe use of pesticides for farmers and also put up a campaign to remind farmers to read the label thoroughly before applying a pesticide. Some companies attached simple protective devices, e.g. rubber gloves and cloth pad etc. with pesticides for sale. One company arranged training courses for doctors, nurses, and public health officials on first aid treatment and remedy of poisoned people.

Pesticide residues in food are regulated under the Food Act B.E. 2522 (1979). The extraneous residue limits (ERLs) and maximum residue limit (MRLs) of certain pesticides were determined. Residues of pesticides other than mentioned in the Food Act shall be conformed to Codex MRLs. The Pesticide Residues Research Sub-Division, Office of Agricultural Production Science Research and Development is responsible for pesticide residues research and monitoring. In the year 2003, this Office analyzed 23 525 samples of food crop and found pesticides residue in 4 885 samples (20.76 percent). Out of this, residues exceeded MRLs in 1 007 samples (4.28 percent) and 3 878 samples (16.48 percent) did not exceed MRLs. Pesticides residues often found on food crops were:

- cypermethrin 0-8.48 ppm
- chlorpyrifos 0-11.5 ppm
- methamidophos 0.003-18 ppm
- endosulfan 0.004-5.63 ppm
- triazophos 0.01-5.24 ppm
- ethion 0.004-46 ppm
- parathion-methyl 0.003-4.45 ppm
- methidathion 0.01-5.51 ppm
- monocrotophos 0.01-1.09 ppm
- carbendazim 0.002-5.09 ppm

Environmental information

Impact of Pesticide Use Sub-Division, Office of Agricultural Production Science Research and Development is responsible for monitoring pesticide contamination in the environment. Samples were collected for analysis of pesticide residues. In the year 2003, number of samples taken from water, soil and sediment were 1964, 560 and 1304, respectively. It was found that the most severe cases were in orange orchards in Fang and Chaiprakarn districts of Chiang Mai province, pesticide residues in water samples were as follows:

Table 1. Type and quantity of pesticide residues found in water resources of Fang and Chaiprakarn district, Chiang Mai Province (2004)

Type of pesticide	No. of sample		Percent	Range of residues (µg/l)
	Total	found		
	98	**89**	**90.8**	**0.001-2.19**
Organochlorines		*(87)*	*(88.8)*	*(0.001-0.7)*
• endosulfan		82	83.7	0.002-0.7
• DDT & metabolites		59	60.2	0.002-0.164
• aldrin & dieldrin		25	25.5	0.001-0.14
• lindane		4	4.1	0.002-0.003
• dicofol		3	3.1	0.004-0.011
Carbamates		*(23)*	*(23.5)*	*(0.018-0.269)*
• metalaxyl		11	11.2	0.026-0.178
• metolcarb		5	5.1	0.018-0.269
• carbofuran		4	4.1	0.027-0.128
• fenobucarb		3	3.1	0.018-0.162
Pyrethroids				
• cypermethrin		4	4.1	0.01-2.19
Quaternary N Compound				
• paraquat		1	1.0	0.533

D. Trends in pesticide manufacture, use and trade

Pesticides are not manufactured in Thailand. Almost all of pesticides were imported in both technical grade materials and formulated products. The only one pesticide, which is paraquat dichloride, is imported as methyl chloride to be manufactured.

Table below shows quantities and values of pesticide imported by Thailand.

Table 2. Import Quantities of Pesticides (1981–2004)

Year	Insecticides		Fungicides		Herbicides		Others		Total	
	quantity	value	quantity	value	quantity	value	quantity	value	quantity	value
1981	3 575	782	2 048	149	3 627	460	53	10	9 301	1 401
1986	5 799	876	2 512	214	4 262	388	204	36	12 777	1 514
1991	5 560	1 275	2 087	371	7 071	1 228	311	171	15 029	3 045
1996	6 479	1 711	4 446	616	14 041	2 445	579	152	25 542	4 924
2000	6 875	2 001	4 931	1 120	17 507	3 841	2 140	333	31 454	7 294
2001	8 356	2 553	5 384	1 265	20 957	4 502	2 341	440	37 038	8 760
2002	9 046	2 930	5 680	1 443	22 670	4 348	2 238	395	39 634	9 116
2003	9 790	3 136	6 732	1 678	31 879	6 101	8 549	471	56 950	11 386
2004	8 372	2 835	6 429	1 719	35 572	6 080	2 676	542	53 049	11 176

Thailand also exports pesticides to neighboring countries. In 2004, the export volume was 3 941 tons of active ingredients comprise of insecticides 1 160 tons, fungicides 1 203 tons, herbicides 1 333 tons, plant growth regulators 57 tons and others 188 tons. The quantity of pesticide for use in the country in 2004 was 49 108 tons. The data of import and export quantities were collected at the ports at every shipment. This year (2005), DOA requires that industries should report their production volumes and the channel of pesticide traffic starting from import, production and sale. The illegal trade of pesticides had been reported in 4 cases. All cases were formulating pesticides and sale with out license.

E. Selected standards

The Department of Agriculture decided that pesticides with high acute toxicity (LD 50 <30 mg/kg) have to be put under surveillance scheme. At present, aldicarb, blasticidin-S, carbofuran, dicrotophos, ethoprophos, formetanate, methidathion, methomyl, oxamyl, EPN and endosulfan (CS formulation) are under surveillance scheme. If there is a report on its impact on health and environment, DOA will take action to ban or severely restrict these pesticides.

Pesticide disposal – On the label, it is recommended to rinse the container with water 3 times before destroying and then followed by burying. It is neither recommended to burn the paper or plastic container nor pour the left-over pesticides into natural water resources. Glass bottles are bought and reused by some pesticide formulators. For obsolete pesticides, DOA in collaboration with FAO, had conducted a survey to find out the quantity and sites where the obsolete pesticides are kept. The budget has been requested to be disposal cost of the obsolete pesticides kept in various sites under responsibility of DOA.

National Legislation and Enforcement – Pesticides are classified as type II and III hazardous substances. For type II hazardous substances, it is required to register but not to get license. The industry is required to notify officials on kind of business to be done such as import, production or possession (for sale or service). For type III hazardous substances, the industry is required to register and get license for import, production or possession.

Conclusions and comments

Thailand has voluntarily practiced the Code for many years. The main problem is misuse of pesticide. Farmers do not strictly follow the label. For example, pesticide is used on crop or pest which is not recommended, the pre-harvest interval is not observed, the protective equipment is not applied, etc. The residues found on crop commodities are the main problems. Ministry of Agriculture and Cooperatives promoted organic farming and started the chemical pesticide reduction scheme. This year it is targeted to reduce use of pesticide about 25 percent. To respond to this scheme, DOA decided to cut down import quantity of pesticides under surveillance scheme and promote use of bio-pesticides which is a safer mean for pest control. There are some local bio-pesticides proposed for registration. DOA has set up a working group for bio-pesticide registration. It is hoped that there will be more bio-pesticides registered for use and closer collaboration with Department of Agricultural Extension and the two pesticide associations for training on safe use of pesticides.

QUESTIONNAIRE SUMMARY

Thailand

Selected Country Statistics:

Agricultural Population	**29.4 million**	**Agricultural Land**	**19.4 million ha**
GDP $143 193 million	Agric. GDP: 9.4%	GNI per capita: $2 190	Hunger: 20%
FAOSTAT Pesticide Data	Export $47 million	Import: $243 million	Use: 39 904 ton

GDP = Gross Domestic Product; GNI = Gross National Income; Hunger = Population below minimum energy requirement; FAOSTAT = latest data entry between 1998 and 2002

Institutional Profile

Ministry	**Legislation**	**Registration**	**Licensing**	**Enforcement**	**Testing**	**Training**	**Monitoring**	
							Environm.	**Health**
Agriculture	**Agr. Reg.**	**Agr. Reg.**	**Agr. Reg.**	**Agr. Reg.**	**P.P.Res**	**Agr. Ext.**	**Agr. Res**	
Environment								
Health								**Epidem.**

Industry Associations: Thai Agri-Business Assoc., Thai Crop Protection Assoc.
Non-Governmental Associations: –

A. Pest and Pesticide Management	
IPM policy declared?	**Yes**
IPM mentioned in…	
Crop Protection Policy?	**Yes**
Agric. Sector Policy?	**Yes**
Other laws/documents?	**Yes**
National IPM Program?	**Yes**
Dept: **DoA**	
IPM extension projects?	**Yes**
IPM research projects?	**Yes**
Pest resistance problems?	**Yes**

B. Testing, Quality Control and Effects	
Laws for pesticide specifications?	**Yes**
Low quality products in market?	**Yes**
Quality control laboratory?	**Yes**
Own analyses in 2004: **6 386**	
Outside analyses in 2004:	

C. Health and Environmental Information	
Data on pesticide poisoning cases?	**Yes**
occupational exposure cases: **1 158**	
accidental exposure and intentional/suicide cases: **706**	
Pesticide poison facilities?	**Yes**
Number of facilities: **1**	
Poison Information and Control Centers?	**Yes**
Number of centers: **5**	
Significant environmental contamination?	**Yes**
Data on effects on wildlife & ecosystems?	**?**
Pesticide residue monitoring system?	**Yes**
Number of analyses 2004: **27 353**	

D. Pesticide Manufacture, Use and Trade		
Pesticide Volume	*Tons*	*$'000 Value*
Imports	**53 050**	**279 295**
Manufacture		
Exports	**3 941**	
Sales		
Pesticide Use Profile	*Tons*	*$'000 Value*
Agriculture (total)	**49 108**	**253 537**
Insecticides	15%	24%
Fungicides	10%	14%
Herbicides	70%	59%
Other	5%	6%
Veterinary		
Public Health		
Household		
Other		
TOTAL		

E. Selected Standards of Code of Conduct	
Illegal trade estimates?	**Yes**
Estimated amount 2004	
Collection of old containers and pesticides?	**Yes**
Inventory of outdated/obsolete products?	**Yes**
Operational pesticide registration system?	**Yes**
Violations in 2004	
Existing facility licensing system?	**Yes**
Inspections in 2004	
Highly toxic products restricted?	**Yes**

Questionnaire responses: Yes = Yes; - - = No; ? = don't know; (blank) = no answer

VIET NAM

by Do Van Hoe

Introduction

1. Viet Nam continues to achieve great success in the agricultural sector in recent years. Rice, coffee, vegetables, fruits and other important crops have increased in terms of production and export, particularly rice.

2. Established in 1961 PPD – Viet Nam is a State management agency under the Ministry of Agriculture and Rural Development (MARD), joined *International Code of Conduct on the Distribution and Use of Pesticide* in 1989 and follows *FAO guideline* and other International Organizations as FAO, UNEP, WHO guideline in promoting GAP and plant protection works.

3. The *FAO Code of Conduct on the Distribution and Use of Pesticide* provides information on pesticide registration and management among countries in order to best implement the code in general and Code of Conduct provides guidelines for pesticide management in Viet Nam in particular.

4. Based on guideline of *FAO Code of Conduct* the registration scheme was revised inline with international scheme and Viet Nam Government support and pay attention to pesticide management and the pesticide management in Viet Nam will be better.

5. Under International Organization guidelines from FAO, UNEP, WHO, the National plant protection and quarantine of Viet Nam was further strengthened and supported by the government in new policy and new regulation.

A. Pest and pesticide management

National Plant Protection Organisation in Viet Nam

Established in 1961, Plant Protection Department (PPD) is a State management body under administration of the Ministry of Agriculture and Rural Development-MARD. It employs around 465 staff working in the areas of plant protection, plant quarantine, inspection, and pesticide management.

Mandate

- To carry out plant protection extension activities
- To administer plant quarantine activities at the national level
- To conduct pesticide management including pesticide registration and residue control

Network

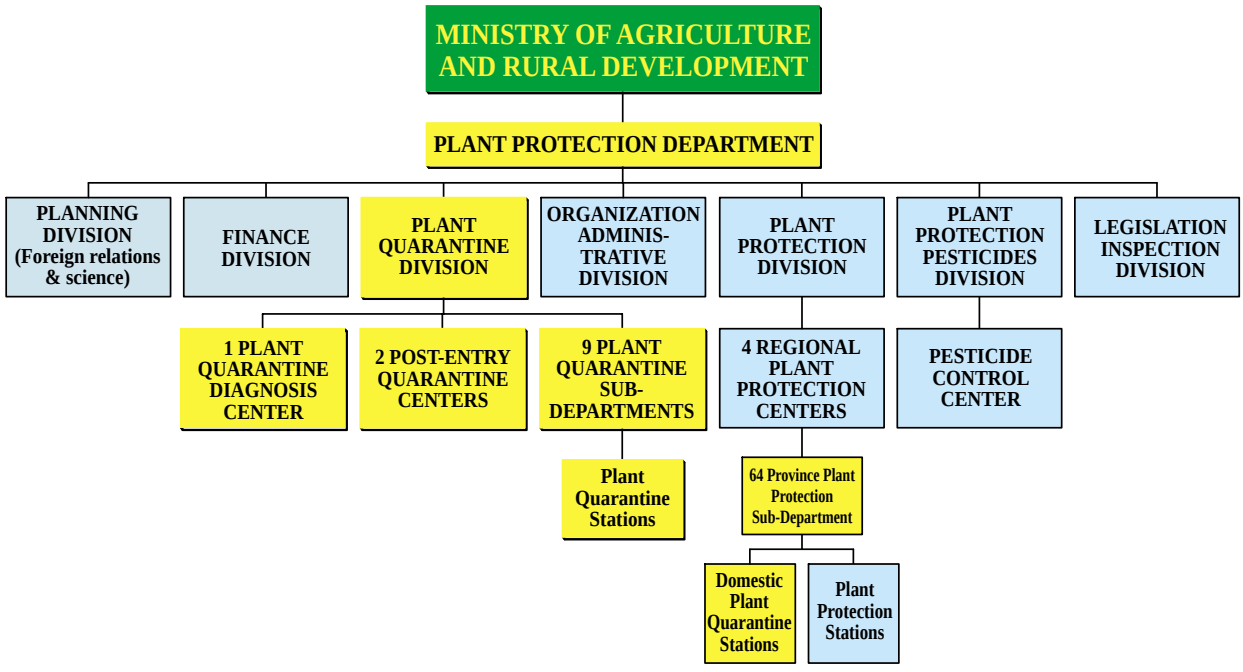
- Pesticide Division: responsible for conducting pesticide management including pesticide registration.

- 4 Regional Plant Protection Centers: Guiding provincial plant protection authorities in pest control, inspection plant protection and quarantine, pesticide management.
- 64 Plant Protection Sub-departments: working at field level and under the jurisdiction of provincial People's Committees
- Manpower: nearly 3 000 Plant Protection Officers

Activities

- Plant Protection Activities
  - Pest surveillance and forecasting to provide early warnings
  - Implementation of pest control programs
  - Training of trainers and farmers on IPM using participatory non-formal education process
- Plant Quarantine Activities
  - Providing phytosanitary inspection services and certification for the import and export of plant commodities
  - Supervising phytosanitary treatments for the import and export of plant commodities
  - Undertaking domestic and post entry quarantine procedures
  - Conducting research and development activities in plant quarantine area
- Pesticide Management
  - Pesticide Division takes responsibility of pesticide management and registration
  - 2 Pesticide Control Centers located in Hanoi and HCMC are assigned to conduct pesticide quality assurance, residue control and field trials for bio-efficacy of pesticides to be registered in Viet Nam

Organizational Chart



National IPM Program in Viet Nam

- Started in 1992 with financial and technical support from FAO with main activities are Training of Trainers (TOT), Farmer Field School (FFS) and follow-up FFS activities.
- PPD is responsible for implementing the National IPM Program coordination with IPM specialist group of PPD working closely with major donors including FAO, WB, EU, DANIDA, and NORAD. Currently, it maintains 11 IPM related projects involving many stakeholders such as farmers, government line ministries, international NGOs, national and international research institutions, and bilateral and multilateral donors.
- IPM priority focused mainly on rice and vegetable crops. Needs of IPM program in Viet Nam further develop and promote including improve the ability of PP-system from center to locality. Continuously innovate curriculum in FFS; FFS approach applied widely in agriculture extension.
- The problem of pest resistance (both agriculture and public health) in Viet Nam is big problem. For the efforts solves this problem methods applied as use resistance varieties, exchange new pesticide, use natural enemies introduced.
- Main constrain to IPM programs in Viet Nam: excessive pesticide advertisement affects mentality of farmers; training demand for farmers is very high but the capacity on financial and manpower limited.

B. Testing, quality control and effects in the field

Control the quality and residue of pesticide

- The quality and residue control of pesticides must follow the regulation of 25th March 2003 issued by MARD. All exported and imported pesticides must be examined for quality.
- The examination is carried out by the North Center and the South Center on pesticide quality and residue control, under PPD. The agricultural products are analysed for residues of pesticides in them.
- The pesticide quality and residue control must conform to the Vietnamese National Standard, sector standard (by MARD) or unit standard (by PPD). In case these standards are not available, PPD allows the use of methods of international organizations or manufacturers who produce the pesticide.
- Main constraints to implementation at national level are limited testing capacity, manpower shortage, lack of equipment, etc.

C. Health and environmental information

- The effects of pesticide on human health and environment take great attention from the government.
  - **The Instruction of Prime Minister No 29/1998/CT-TTg** *on strengthening the control on the use of pesticides and other organic chemical to be difficult in decomposition (POP) issued on August 25, 1998.*
  - **Ministry of Natural Resource and Environment** have issued *the technical procedures for disposing or re-use of remaining and banned substances in organic-phosphorous class, cyanic substances, organic-chlorine class.*

- In Viet Nam, responsibility of monitoring the effects of pesticide on human health is with the Ministry of Health, the effects of pesticide on the environment with the Ministry of Natural Resources and Environment.

D. Pesticide use in Viet Nam

Before 1992, there were only 77 active ingredients with 96 product names belonging to 25 foreign firms that have been permitted for use in Viet Nam. Up to now 2005, there have been more than 400 active ingredients with more than 1 000 product names which are supplied by more than 100 foreign and domestic companies (Table 3).

Table 1. Status of the imported pesticide and companies concerned

Year	Active ingredients	Product names	Companies
Before 1992	77	96	25
2004	436	1.231	over 100

About 99 percent of pesticides quantities used in Viet Nam are imported. In recent years, imported pesticide quantities rose to nearly 50 000 tons finished product fp/year (2004) from 13.000 – 14.000 tons fp/year before 1990, while imported value have been increased to around 200 mill USD (1998) and about 166 mill USD (2003) from 10 mill USD before 1990 (Table 4).

Table 2. Amount and value of imported pesticide

Year	Amount (tons)	Value (mil USD)
Before 1990	13 000 – 14 000	10
1998	42 000	197
1999	33 715	160
2000	33 637	158
2003	36 018	166
2004	48 288	159

It should be noted that pesticide kinds have been changed considerably. If in 1991 insecticide makes up 83.3 percent, fungicide 9.5 percent, herbicide 4.1 percent, others 3.1 percent, respectively, then in 2004 that ratio was 38.0 percent, 28.0 percent, 30 percent and 1.8 percent, respectively.

Table 3. Ratio of different kinds of pesticide supplied in Viet Nam

Year	Insecticide	Fungicide	Herbicide	other
1991	83.3%	9.5%	4.1%	3.1%
1999	48.3%	23.1%	26.9%	1.7%
2000	50.11%	27.43%	19.71%	2.75%
2002	40.30%	32.60%	25.30%	1.80%
2003	38.00%	28.00%	30.00%	2.97%
2004	37.10%	37.10%	29.80%	1.30%

E. Selected standards

- Ordinance on Plant Protection and Quarantine and legal documents related to pesticide has been revised in 2001 including pesticide regulations.
- Checking yearly phasing severely toxic pesticide out of list of pesticides permitted for use in Viet Nam.
- Raising awareness and training for farmers on using pesticide implemented widely in whole country by IPM program and other programs.
- Under assistance from International organizations, national and NGO organizations. Viet Nam government makes efforts on inventory, collection and disposal of obsolete pesticides remaining.
- Some constraints to implementation at national level such as limited testing capacity, manpower shortage, lack of equipment, etc.

Conclusions and comments

Areas of the code that are important for Viet Nam

- Providing information on pesticide registration and management among countries in order to best conducting the Code.
- Code of Conduct provides guideline for pesticide management in Viet Nam.
- Training/workshop that improved the knowledge of officers for better management pesticide in Viet Nam.

Strength and weakness of the present pesticide management system in Viet Nam

Strength

- Based on guideline, the registration scheme was revised inline with international scheme.
- Viet Nam Government support and pay attention to pesticide management and the pesticide management in Viet Nam will be better.
- Training/education farmers and providing them the best knowledge on pesticide use.

Weakness

- Awareness of farmer on pesticide still limited.
- Pressure of commercialization.
- Influence of pesticide companies is still high.
- Inspection and control pesticide import, formulation, business still need to be strengthened.

Major bottom-necks to ensure sound pesticide management

- The most important is to have National Program of Training/Education Farmer to improve their knowledge on the best use of pesticides.

Priority in Viet Nam that need to be strengthened

- Amendment of pesticide registration scheme.
- Expanding the inspection and control of pesticide importation, formulation, distribution and use.
- Continuation of training/education program on safe use of pesticide.

QUESTIONNAIRE SUMMARY

Viet Nam

Selected Country Statistics:

Agricultural Population	**53.4 million**	**Agricultural Land**	**9.0 million ha**
GDP $39 157 million	Agric. GDP: 23.0%	GNI per capita: $480	Hunger: 19%
FAOSTAT Pesticide Data	Export	Import: $20.0 million	Use: 19 154 ton

GDP = Gross Domestic Product; GNI = Gross National Income; Hunger = Population below minimum energy requirement; FAOSTAT = latest data entry between 1998 and 2002

Institutional Profile

Ministry	**Legislation**	**Registration**	**Licensing**	**Enforcement**	**Testing**	**Training**	**Monitoring**	
							Environm.	**Health**
Agriculture	**PPD**	**PPD**	**SPPD**	**PPD**		**PPD**		
Environment								
Health								

Industry Associations: –
Non-Governmental Associations: Viet Nam Plant Protection Assoc. (VPPA)

A. Pest and Pesticide Management	
IPM policy declared?	**Yes**
IPM mentioned in…	
Crop Protection Policy?	**Yes**
Agric. Sector Policy?	**Yes**
Other laws/documents?	**Yes**
National IPM Program?	**Yes**
Dept: **PPD**	
IPM extension projects?	**Yes**
IPM research projects?	--
Pest resistance problems?	**Yes**

B. Testing, Quality Control and Effects	
Laws for pesticide specifications?	**Yes**
Low quality products in market?	**Yes**
Quality control laboratory?	**Yes**
Own analyses in 2004: **>2 000**	
Outside analyses in 2004:	

C. Health and Environmental Information	
Data on pesticide poisoning cases?	**Yes**
occupational exposure cases: **331**	
accidental exposure cases: **1 105**	
intentional/suicide cases: **4 937**	
Pesticide poison facilities?	--
Number of facilities:	
Poison Information and Control Centers?	**Yes**
Number of centers: **1**	
Significant environmental contamination?	**Yes**
Data on effects on wildlife & ecosystems?	--
Pesticide residue monitoring system?	**Yes**
Number of analyses 2004: **2 000**	

D. Pesticide Manufacture, Use and Trade		
Pesticide Volume	*Tons*	*$'000 Value*
Imports	**24 144**	**159 000**
Manufacture		
Exports		
Sales		
Pesticide Use Profile	*Tons*	*$'000 Value*
Agriculture (total)	**24 144**	
Insecticides	33%	
Fungicides	32%	
Herbicides	29%	
Other	1%	
Veterinary		
Public Health		
Household		
Other	**328**	
TOTAL	**24 473**	**>159 000**

E. Selected Standards of Code of Conduct	
Illegal trade estimates?	**Yes**
Estimated amount 2004: **<5%**	
Collection of old containers and pesticides?	**Yes**
Inventory of outdated/obsolete products?	**Yes**
Operational pesticide registration system?	**Yes**
Violations in 2004	
Existing facility licensing system?	**Yes**
Inspections in 2004	
Highly toxic products restricted?	**Yes**

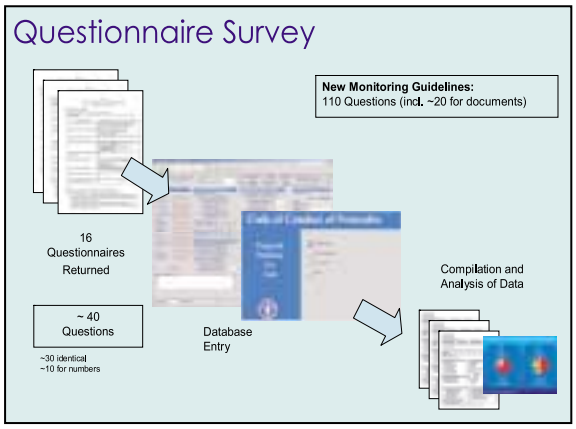
Questionnaire responses: Yes = Yes; - - = No; ? = don't know; (blank) = no answer

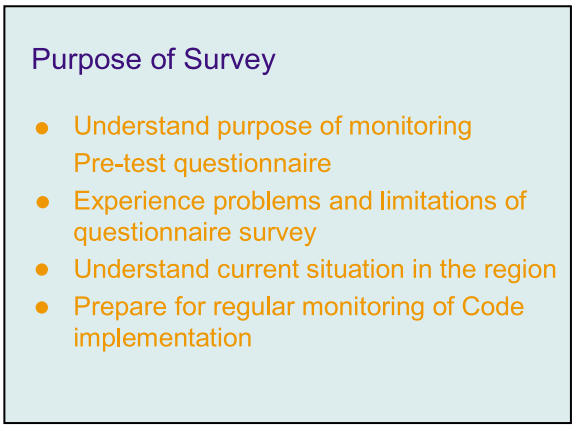
3. Regional overview, pesticide policy and monitoring guidelines

3.1 Regional overview and analysis of country reports

by Gerd Walter-Echols and Piao Yongfan

The country reports in the previous chapter reflect a great diversity within the Asia region in terms of pesticide management. The questionnaire annex that was submitted by the country delegates allowed for a systematic comparison of selected pesticide management aspects, similar to the proposed monitoring of Code implementation as stipulated in Article 12 of the revised version. The workshop questionnaire, however, contained only about 40 questions as compared to the 110 questions in the draft monitoring guidelines. About 30 of the questions were identical. This allowed the workshop participants to practice Code monitoring, to better understand the purpose and procedure of the proposed monitoring guidelines and to see how their answers affect the overall outcome.

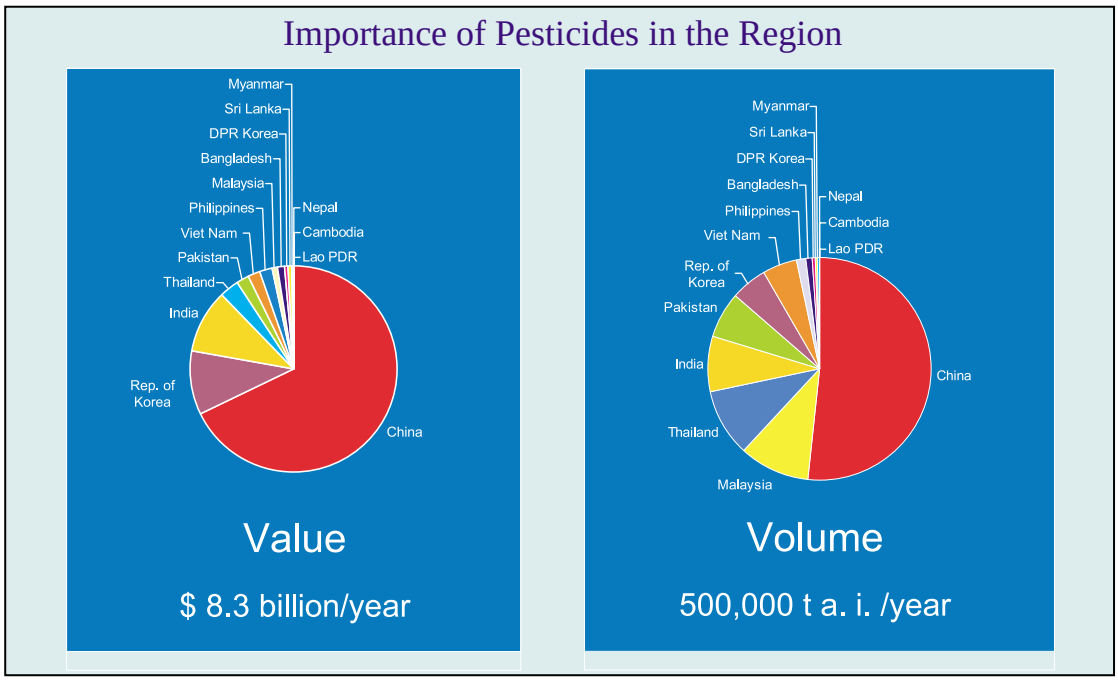




The answers from the questionnaires were entered into a database and the results were reported in the "Questionnaire Summaries" at the end of each country report in the previous chapter. In addition, the answers were analyzed with regard to the overall situation of Code implementation in the Asia region.

Not all country delegates were able to answer all the questions. It became clear from this exercise that most countries do not have a single institution that is knowledgeable about all aspects of pesticide management, but this information is scattered over several institutions. This situation is likely to hinder a comprehensive assessment of the benefits and risks of pesticides and the development of appropriate policies. It makes the proposed monitoring of Code implementation difficult as it would require a collaborative effort between multiple partners in order to yield meaningful results. If this effort is not made, the proposed future monitoring of Code implementation would yield incomplete, misleading or incorrect answers. The results from the workshop questionnaire reflect the same difficulties and they may differ significantly from the actual situation. Therefore, the workshop questionnaire survey was a useful exercise to make participants aware of these problems.

According to the results provided by the participants, the overall annual pesticide use was estimated at close to 500 000 tons active ingredients valued at US$8.3 billion. This figure is considerably higher than other estimates which put the Asian pesticide value at about US$5 billion per year. For comparison, this value is more than the national gross products of Cambodia and Lao PDR combined. It has been said that the trend of pesticide use is increasing in Asia, while worldwide it is stagnant. More than half of the regional pesticides are used in China.



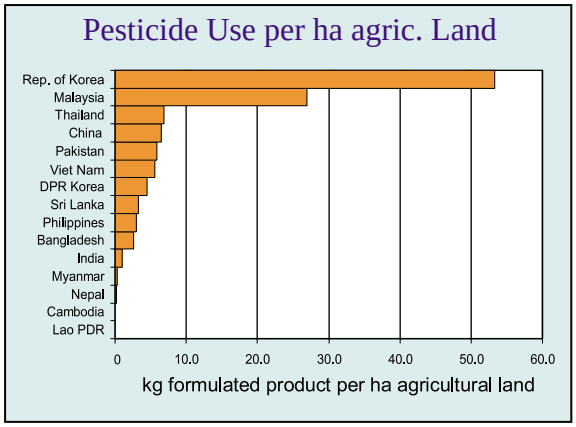
These figures are based on the following country estimates. In some instances, conversion factors were used to complete the table, such as 4 kg formulated product per kg of technical active ingredient (a.i.) and US$20 per kg technical a.i. Actual values may differ from these estimates, however, they were not available.

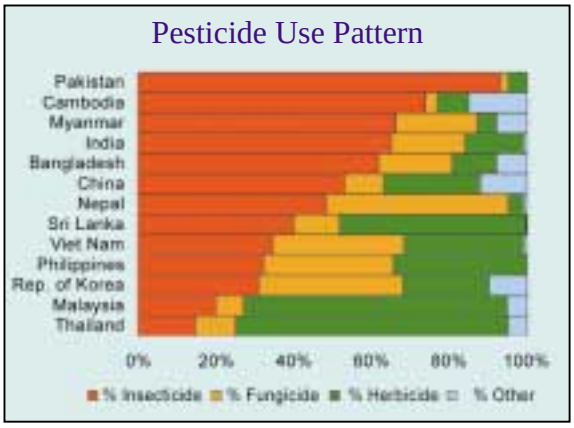
Annual Pesticide Consumption

Country	Ton a.i.	Ton Product	$ '000 Value	t prod/ai	$/ton a.i.	$/ton Prod.
Bangladesh	**3 635**	**22 100**	**75 000**	6.1	20.6	3.4
Cambodia	**42**	**198**	**226**	4.7	5.4	1.1
China	**258 000**	**1 000 000**	**5 670 000**	3.9	22.0	5.7
DPR Korea	**3 000**	*12 000*	*60 000*	*4.0*	*20.0*	*5.0*
India	**41 020**	*164 080*	*820 400*	*4.0*	*20.0*	*5.0*
Rep. of Korea	**26 610**	*100 000*	**842 638**	*3.8*	31.7	8.4
Lao PDR	**10**	*40*	*200*	*4.0*	*20.0*	*5.0*
Malaysia	**51 065**	*204 260*	**85 020**	*4.0*	1.7	0.4
Myanmar	*758*	**3 030**	*15 095*	*4.0*	*20.0*	*5.0*
Nepal	**145**	*580*	**2 100**	*4.0*	14.5	3.6
Pakistan	*32 500*	**129 589**	**172 300**	*4.0*	5.3	1.3
Philippines	*7 934*	**31 735**	*158 675*	*4.0*	*20.0*	*5.0*
Sri Lanka	**1 696**	**6 329**	**49 000**	3.7	28.9	7.7
Thailand	**49 108**	*132 509*	**253 537**	2.7	5.2	1.9
Viet Nam	**24 473**	**50 000**	**159 000**	2.0	6.5	3.2
	499 996	**1 856 450**	**8 363 191**			

italic numbers = calculated estimates

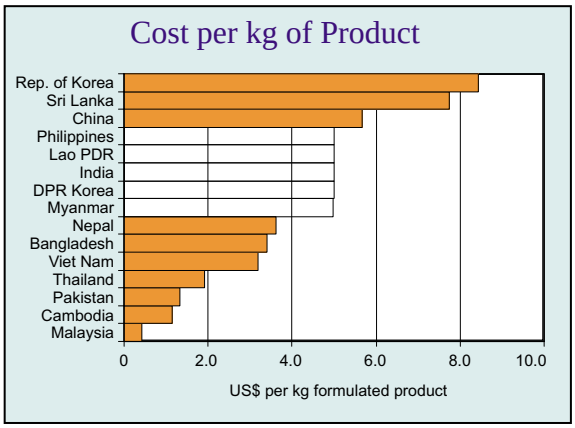
The pattern of pesticide use differs significantly between the countries. Per hectare of agricultural land, most pesticides are used in the Republic of Korea, followed by Malaysia. According to the information collected, the least intensive pesticide users are Lao PDR, Cambodia and Nepal; however, these countries may have unrecorded pesticides from cross border trade which would increase the actual figures.



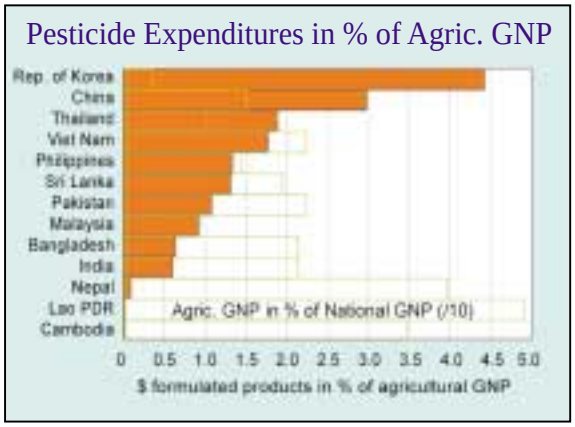


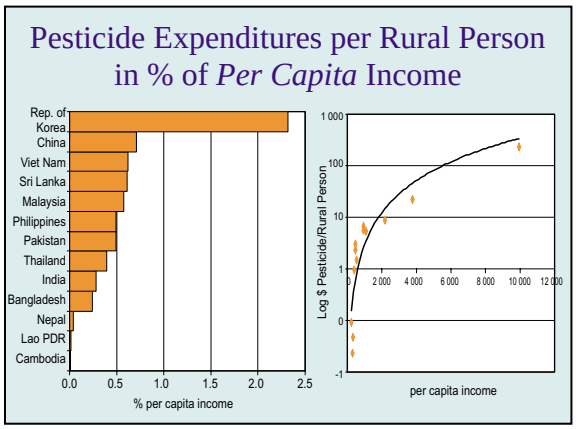
Most pesticides used are insecticides, particularly in Pakistan, Cambodia, Myanmar, India and Bangladesh. Herbicides dominate the markets in Thailand, Malaysia and Sri Lanka where they are used in plantation crops. The country with the largest share of fungicides was Nepal.

A low pesticide price was not correlated with intensive use. The Republic of Korea has both the highest unit price and the highest consumption. Malaysia, the second most intensive pesticide user, however, has the lowest reported pesticide prices. Other low-price countries with less than US$2 per kg formulated product were Cambodia, Pakistan and Thailand.



Pesticide expenditures in relation to the agricultural GNP or the per capita income again were the highest in the Republic of Korea, followed by China. It was the lowest in Cambodia, Lao PDR and Nepal which are predominantly agricultural countries with more than 30 percent of their GNP coming from agriculture, and at the same time having the lowest per capita income.

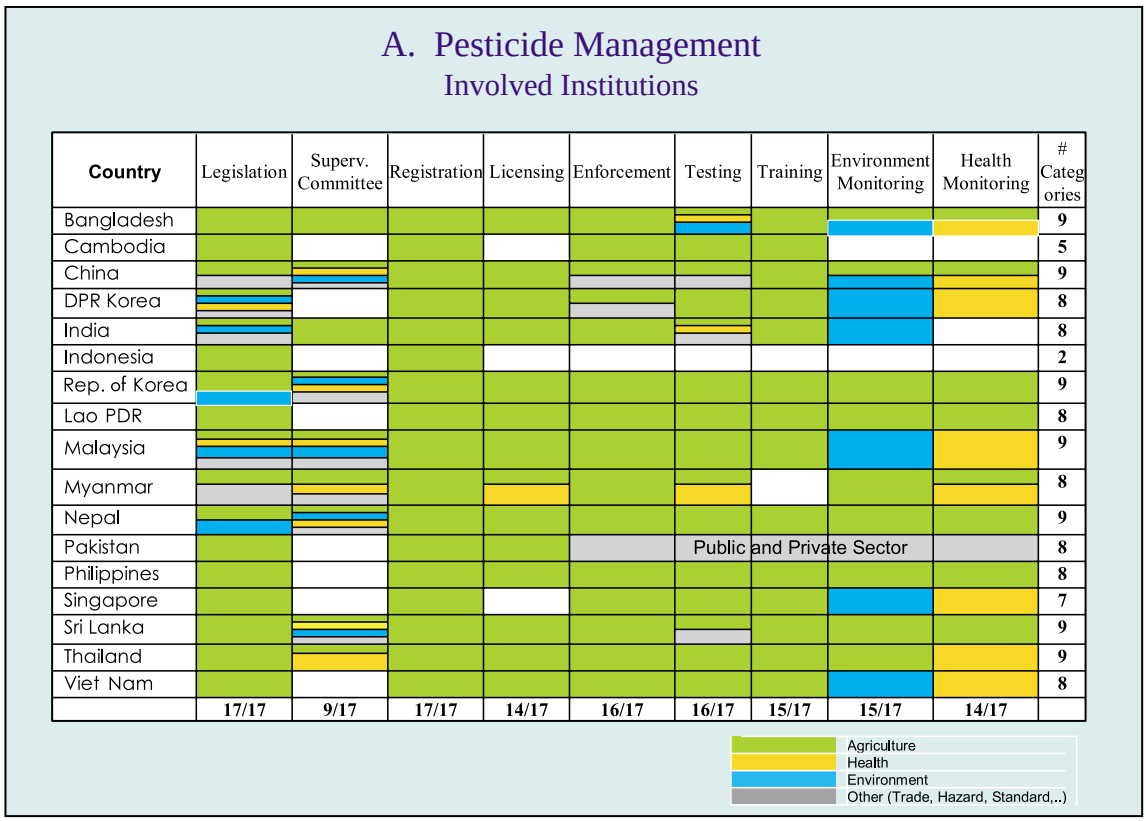




Pesticide management

All countries in the Asia region have passed appropriate legislation and have established registration systems to control and supervise the use of pesticides. In most countries, the legislation is pesticide-specific (see Annex 3 for details), while in others pesticides are already regulated in the context of a comprehensive policy on hazardous materials management and environmental protection.

With regard to the institutions in charge of pesticide management, they predominantly belong to the Ministry of Agriculture. Other institutions such as Ministries of Health, Environment or Trade are represented in most of the supervisory committees that exist in about half the countries. The Ministry of Health is primarily in charge of monitoring health effects of pesticides, even though the Ministry of Agriculture is reported to do this also in eight countries. Likewise, environmental agencies are involved in monitoring environmental effects in seven countries.



Country	Legislation	Superv. Committee	Registration	Licensing	Enforcement	Testing	Training	Environment Monitoring	Health Monitoring	# Categories
Bangladesh										9
Cambodia										5
China										9
DPR Korea										8
India										8
Indonesia										2
Rep. of Korea										9
Lao PDR										8
Malaysia										9
Myanmar										8
Nepal										9
Pakistan										8
Philippines										8
Singapore										7
Sri Lanka										9
Thailand										9
Viet Nam										8
	17/17	9/17	17/17	14/17	16/17	16/17	15/17	15/17	14/17	

Pest management

All countries have IPM activities to promote alternative approaches to chemical pest control. National IPM Programmes are reported from all countries except for Singapore. These programmes are mostly associated with extension activities. A national IPM policy has been declared in 12 countries.

One country, the Republic of Korea, has no IPM policy, but has set a target to reduce pesticides by 50 percent. There were no reports from any other country that their IPM policy was linked with a pesticide reduction target. This raises the question of effectiveness of IPM policies and programmes when they are not coupled with a national pesticide management strategy as proposed in the revised Code. This is particularly important as pesticide use appears to be on the rise despite the widespread commitment to IPM.

A. Pest Management

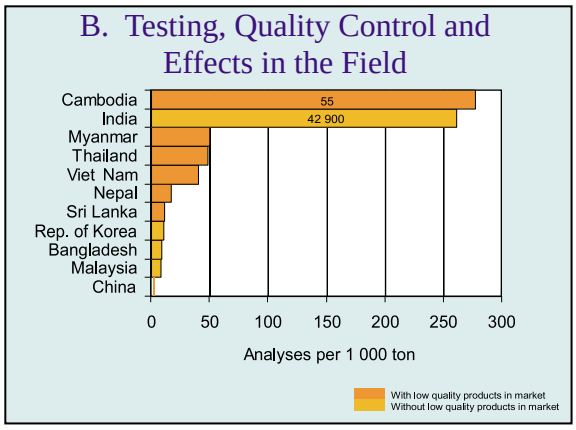
Country	IPM Policy	IPM in Crop Protection Policy	IPM in Agric. Sector Policy	IPM in Other policy	Natl. IPM Program	IPM Extension Projects	IPM Research Projects	#
Bangladesh								7
Cambodia								7
DPR Korea								7
India								7
Malaysia								7
Nepal								7
Pakistan								7
Philippines								7
Thailand								7
Sri Lanka								6
Viet Nam								6
China								5
Lao PDR								4
Myanmar								3
Rep. of Korea								2
Singapore								2
# affirmative	12/16	12/16	13/16	12/16	15/16	15/16	12/16	
%								

Testing, quality control and effects in the field

All countries except Singapore have laws specifying the quality of pesticides, usually following FAO/WHO standards. All countries except Lao PDR and Singapore possess laboratories to check the quality of pesticides, however, the capacity and number of analysis per year differs greatly between the countries. Most analyses are done by India, Thailand and Viet Nam. Relative to the amount of pesticides sold, however, Cambodia and India made the most quality checks.

B. Testing, Quality Control and Effects in the Field

Country	Laws for Specifications	Quality Control Laboratories	Number of annual analyses	Low Quality Products?
India			42 900	
Thailand			6 386	
Viet Nam			>2 000	
Malaysia			1 649	
Rep. of Korea			1 080	
Bangladesh			200	
Myanmar			150	
China			116	
Sri Lanka			69	
Cambodia			55	
Nepal			10	
DPR Korea				
Indonesia				
Pakistan				
Philippines				
Lao PDR				
Singapore				
	16/17	15/17		10/17



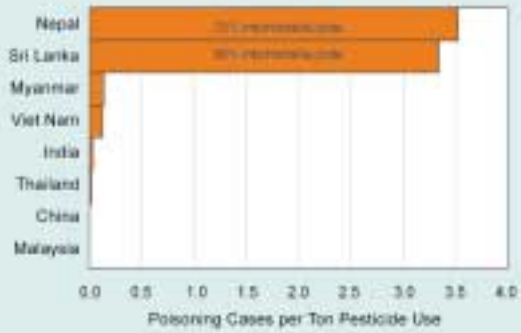
Health information

Only half the countries have data on pesticide poisoning cases or possess poison control or treatment centers. The number of reported cases varies greatly and probably reflects more the efforts made by some individuals than the actual situation in the country. Relative to the amount of pesticides used, most poisoning cases were reported from Nepal and Sri Lanka; 70-80 percent of these cases were intentional suicides. Reported occupational and accidental exposure cases amounted to only 1.2, 0.5 and 0.2 cases per ton of pesticide used for Nepal, Sri Lanka and Thailand, respectively. Due to the difficulties in obtaining accurate poisoning estimates that do not only cover the most severe cases of hospital admissions, these figures are not likely to represent an accurate picture of the effects of pesticides on human health in the Asia region.

C. Health Information

Country	Data on pesticide poisoning cases	Poisoning Treatment Centers	Poison Control Centers
Sri Lanka	21 129		1
Viet Nam	6 373		1
India	4 789	5	1
Thailand	2 509	1	1
China	2 044		1
Nepal	2 043		1
Myanmar	413	1	1
Malaysia	142	1	1
Pakistan		2	1
Bangladesh		64	
DPR Korea			
Cambodia			
Indonesia			
Rep. of Korea			
Lao PDR			
Philippines			
Singapore			
	8/17	9/17	9/17

C. Health Information



Environmental information

Similar to data on pesticide effects on human health, data on pesticide effects on the environment are also very incomplete. Even though 13 countries reported possessing a residue monitoring system, only one country (Republic of Korea) reported having data on ecological and wildlife effects of pesticides. Four countries reported that they have significant environmental contamination from pesticides. However, with the absence of actual data, questionnaire responses are probably only personal opinions which may not always be based on a detailed knowledge of the situation. To obtain a more meaningful assessment of the pesticide effects on the environment, a more systematic collection of data and case studies is needed.

C. Environmental Information

Country	Residue Monitoring System	Number of Analyses	Environmental Contamination	Data on Ecological and Wildlife Effects
Thailand		27 353		
China		5 823		
Viet Nam		2 000		
Malaysia		1 649		
Rep. of Korea		850		
Nepal		124		
Singapore		113		
Sri Lanka		98		
Myanmar		80		
DPR Korea				
India				
Pakistan				
Philippines				
Bangladesh				
Cambodia				
Indonesia				
Lao PDR				
	13/17		4/17	1/17

Pesticide manufacture, use and trade

Only a few country reports contained a comprehensive description of the pesticide market. For a complete picture one would need to know the amounts of pesticides manufactured and formulated in the country, plus the amounts imported and exported. With this information one could cross-check the pesticide use estimates and determine the amount of illegal trade, which is probably more widespread than only in the three countries that reported estimates.

D. Pesticide Manufacture, Use & Trade



D. Pesticide Manufacture, Use & Trade

Country	Breakdown Agricultural Use	Overall Trade Data	Household Pesticide Data	Public Health Pesticide Data	Illegal Trade Estimates
Bangladesh					
Pakistan					
Rep. of Korea					
Nepal					
Malaysia					
Myanmar					
Cambodia					
China					
India					
Philippines					
Sri Lanka					
Thailand					
Viet Nam					
Lao PDR					
DPR Korea					
	12 / 17	4 / 17	0/17	2/17	3/17

Few country reports contained information on the amounts of public health and household pesticides. It is possible that these uses are not covered by the existing legislation and registration which focuses primarily on agricultural pesticides. Most countries were knowledgeable about the amounts of insecticides, fungicides and herbicides used. For more accurate and meaningful data on volume and value, however, one would need to report the information separately for the different chemical classes.

Selected standards

In all but one country (India), the use of highly toxic pesticides is banned or severely restricted. About half the countries reported having services to collect and safely dispose of containers and small quantities of left-over pesticides; details about these services were not made available. Also, about half the countries reported having an inventory of outdated and obsolete products.

E. Selected Standards of the Code

Country	Highly Toxic Restrictions	Licensing Enforcement	Collection of old containers/ pesticides	Inventory of out-dated/ obsolete pesticides
Bangladesh		40*		
Rep. of Korea		22*		
Lao PDR		6*		
Indonesia				
Nepal				
Pakistan				
Thailand				
Viet Nam				
DPR Korea				
Singapore				
Sri Lanka				
Cambodia				
China				
Malaysia				
Myanmar				
Philippines				
India				
	16/17	3/17	8/17	7/17

* = number of inspections

Industry and NGO Associations

Country	Industry Associations	NGO
Bangladesh	CPA	B. Paribesh Undolon
Cambodia		CEDAC, SRE Khmer
China	CropLife, CPIA	
DPR Korea		
India	CropLife, IPCA, CCF	CSE, etc.
Indonesia		
Rep. of Korea	KCPA	Consumer Korea
Lao PDR		
Malaysia	MCC&PHA	PAN, CET
Myanmar		
Nepal		Env. Journ.
Pakistan	CropLife, PCPA, PIFA	Farmer Vision
Philippines	Crop Life, PCPA,	PAN
Singapore		
Sri Lanka	CropLife	VIKALPANI
Thailand	TABA, TCPA	
Viet Nam		VPPA
	9/17	**10/17**

Industry associations of pesticide manufacturers and dealers exist only in nine countries, and ten countries reported having non-governmental organisations with an interest in pesticide related issues. These associations could be valuable partners for monitoring Code implementation.

Conclusion and comments

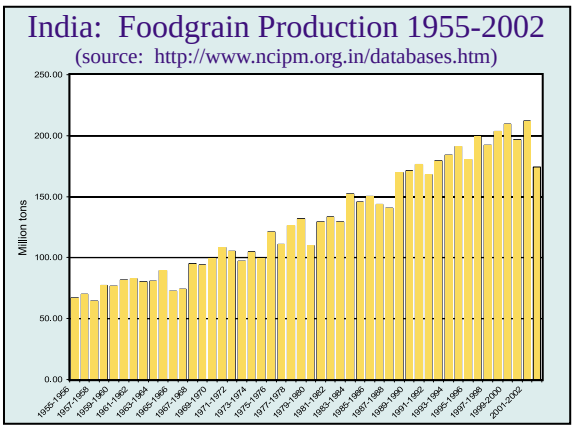
The workshop questionnaire exercise raised an important question: Who should monitor Code implementation? Monitoring is only useful if the collected information is comprehensive and accurately reflects the situation in the country. Most importantly, however, the proposed monitoring should not only be seen as a required reporting to FAO, but as an opportunity to assess the effectiveness of the country's own policies on pest and pesticide management. Therefore, policy makers should become involved. The questionnaire responses should be thoroughly discussed and reflected at the country level.

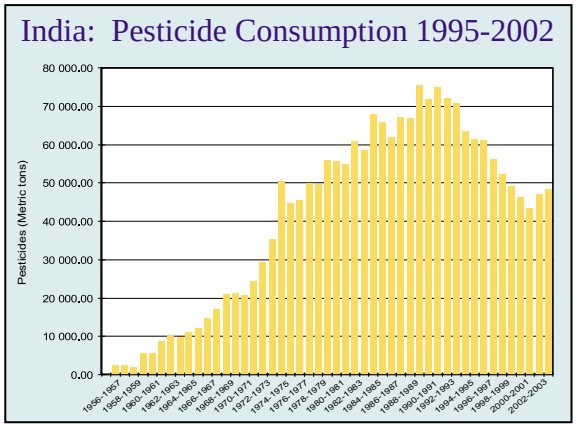
Conclusions and Comments

- Who should answer questionnaire?
  - is registration authority best informed?
  - quality of existing data
  - who wants to know?
- Are the necessary policies formulated?
  - pesticide as damage control agent, not production input
  - strengthening on natural antagonistic potential (ecol. IPM)
  - protection against hazardous materials?
  - protection of environment?
  - farmer education for self-reliant management
- Are policies effective?

The Code of Conduct is a policy document to which each country has committed itself through the FAO Assembly. It is now up to the countries to determine which part of this policy needs strengthening. For example, country pesticide policies should treat pesticides not as production inputs, but as damage control agents. As data from India

clearly show, foodgrain production is not linked with pesticide consumption. In that country, the volume of pesticides used declined by about 30 percent since 1990, while foodgrain production continued to rise with increased fertilizer consumption.





The revised Code of Conduct provides a unique opportunity for all countries to assess the effectiveness of their pesticide management policies. It could be used as an instrument to bring together information from different institutions and organizations for a comprehensive look at the benefits and risks of pesticides. As reflected in the Code, pesticide policies must be effectively linked with appropriate pest management policies in order to achieve synergistic benefits. So far, there is inconsistent evidence among Asian countries of consistent pest and pesticide management policies with clear national targets.

Conclusions and Comments

Code is not limited to …

- agricultural pesticides
- pesticide registration
- licensing schemes
- health monitoring
- environmental monitoring
- trade monitoring

... these are only the means for **...**

Conclusions and Comments

The Real Goals of the Code are …

- protecting people from hazardous materials
- protecting the environment
- sustainable development
- fair and responsible trade

Conclusions and Comments

Therefore …
Monitoring the implementation of the *Code of Conduct* should provide information about the effectiveness (or need for strengthening) of policies that

- protect people from hazardous materials
- protect the environment
- promote sustainable development
- promote fair and responsible trade

Conclusions and Comments

Therefore …
Monitoring the implementation of the *Code of Conduct* provides a perfect opportunity to

- strengthen the **dialogue** between stakeholders;
- provide **feedback** to policy makers on effectiveness of pest and pesticide management policies

3.2 Pesticide policy in Thailand

by Picheat Prommoon

Thailand is one of few countries in the region which has conducted, with the assistance of GTZ, a systematic pesticide policy analysis which resulted in a comprehensive pesticide policy strategy of 2002 to 2006.

FOOD SAFETY STRATEGY IN THAILAND

S1. INPUT & RAW MATERIAL LEVEL

1. Get samples, Lab test all imported pesticide - over 3,000 shipment yearly
2. Sampling test pesticide at factory and retailer - over 8,000
3. Watching lists and ban high toxic
4. Train producer, whole seller, retailer for Chem and Fert - give Q
5. Strictly control on imported goods
6. Accelerate proper use on pesticide at farm

FOOD SAFETY STRATEGY IN THAILAND

S2. FARM LEVEL

1. Register, follow up, inspect 27 crops at farm with 1:25:50 ratio, over 400,000
2. Test product and certify GAP farm- give Q - over 100,000
3. Introduce traceability system - from farm to table

FOOD SAFETY STRATEGY IN THAILAND

S3. PROCESSING LEVEL

1. Inspect raw material, processing for GMP and HACCP for exporter - give Q 200+16
2. Train producer to reduce contaminated substance, chemical
3. Improve laboratory efficiency

FOOD SAFETY STRATEGY IN THAILAND

S4. END PRODUCT LEVEL

1. Inspect 12 crops to 7 major countries
2. Strictly inspect pilot project for vegetable export to Japan
3. Inspect other exported crops - 5% over MRL - Metha, Cyper, Chlorpyrifos
4. MRL trail test
5. Improve government labs in BKK and main ports

FOOD SAFETY STRATEGY IN THAILAND

Q series

1. Q shops buy from Q pesticide and fertilizer producers
2. Q or GAP farmers buy from Q shops
3. Q processing factories buy from Q farm
4. Q exporters buy from Q processor & Q farm

ALL Qs GET FAST TRACK & PREFERENCE & PANELTY

FOOD SAFETY STRATEGY IN THAILAND

Q quantity

1.	Q producers	- coming 10
2.	Q shops	- 32
3.	Q or GAP farmers	- over 100,000
4.	Q processing	- 216
5.	Q exporters	- on going

3.3 Policy development for rational use of pesticides in Pakistan

by Rasheed Bashir Mazari

From 2000 to 2001, Pakistan conducted, with UNDP assistance, a pesticide policy analysis and reviewed risks and benefits from pesticides use in the country. As one of the results from this study, a National IPM Program was founded and funded by the Government to promote a more rational use of pesticides.

