

PL-AP-459
-A-9527

**Pesticide
Regulatory
Policies of
Selected Countries
in Asia**

Technical Report No. 2



**Regional Agribusiness Project
7250 Woodmont Avenue, Suite 200, Bethesda, Maryland 20814**

DEVELOPMENT ALTERNATIVES, INC. ■ Abt Associates Inc. ■ Fintrac Inc. ■ Technical Assessment Systems, Inc. ■ DPRA Incorporated ■ IMCC ■ Land O'Lakes, Inc. ■ Postharvest Institute for Perishables ■ United Fresh Fruit and Vegetable Association ■ GIC Agricultural Group

Pesticide Regulatory Policies of Selected Countries in Asia

by

Cecilia P. Gaston

October 1994

Prepared for the Regional Agribusiness Project (RAP), contract no. AEP-0009-C-00-3057-00, with funding from the Asia and Near East Bureau of the U.S. Agency for International Development

TABLE OF CONTENTS

	<u>Page</u>
SECTION ONE	
INTRODUCTION	1
SECTION TWO	
PEST MANAGEMENT POLICIES AND PESTICIDE USE	3
PEST MANAGEMENT POLICIES	3
PATTERNS OF PESTICIDE CONSUMPTION AND USE	3
PESTICIDE INDUSTRY AND PRODUCTION	4
SECTION THREE	
REGULATORY PRACTICES AND PROCEDURES	5
LEGAL REQUIREMENTS AND BASIC INFRASTRUCTURE	5
REGISTRATION PROCEDURES AND DATA REQUIREMENTS	6
DATA ASSESSMENT AND REGISTRATION DECISIONS	6
LABELING REQUIREMENTS	6
ENFORCEMENT MECHANISMS	7
MONITORING AND TRAINING PROGRAMS	7
BANNED AND RESTRICTED PESTICIDES	7
SECTION FOUR	
PESTICIDE REGULATORY POLICIES ON IMPORTS OF AGRICULTURAL COMMODITIES IN JAPAN AND KOREA	9
JAPAN	9
KOREA	9
SECTION FIVE	
COUNTRY PROFILES	11
INDIA	11
Pest Management and Pesticide Use	11
Pesticide Industry and Production	11
Pesticide Regulatory Policies and Procedures	12
INDONESIA	13
Pest Management and Pesticide Usage	13
Pesticide Industry and Production	13
Pesticide Regulatory Policies and Procedures	14

NEPAL	15
Pest Management and Pesticide Use	15
Pesticide Industry and Production	16
Pesticide Regulatory Policies and Procedures	16
PHILIPPINES	16
Pest Management and Pesticide Use	16
Pesticide Industry and Production	17
Pesticide Regulatory Policies and Procedures	17
SRI LANKA	18
Pest Management and Pesticide Use	18
Pesticide Industry and Production	18
Pesticide Regulatory Policies and Procedures	18
THAILAND	19
Pest Management and Pesticide Use	19
Pesticide Industry and Production	19
Pesticide Regulatory Policies and Procedures	19
CHINA	20
Pest Management and Pesticide Use	20
Pesticide Industry and Production	21
Pesticide Regulatory Policies and Procedures	21
VIETNAM	22
Pest Management and Pesticide Use	22
Pesticide Industry and Production	23
Pesticide Regulatory Policies and Procedures	23
REFERENCES	25
ANNEX A: SUMMARY OF PEST MANAGEMENT PRACTICES AND PESTICIDE USE	A-1
ANNEX B: SUMMARY OF PESTICIDE REGULATORY POLICIES AND PROCEDURES	B-1

SECTION ONE

INTRODUCTION

Asia is experiencing tremendous changes in agricultural and industrial development. Associated with these changes is the dilemma of increasing crop productivity to attain self-sufficiency and capture the export market versus maintaining the quality of the environment and minimizing health hazards. Use of pesticides is still increasing in Asia; so is the awareness of their potential hazards. Developing countries in Asia lose 30 to 60 percent of crops because of pests. At the same time, reports of poisoning and adverse effects on the environment have been frequent. There is, therefore, a clear need to balance the production of more food for growing populations with the development of a cleaner, safer environment. Governments in Asia have accepted this challenge and have taken steps toward adoption of policies to attain this balance.

The 1980s saw the beginning of the process of instituting adequate controls on the use of pesticides and shifts in policies toward greater use of alternative pest control methods. Although the latest estimates of pesticide use still show an increase in the use of herbicides, fungicides, and rodenticides, there has been a remarkable decline in insecticide use, including the removal of persistent organochlorines. Other highly toxic pesticides have also been removed from agricultural use, and there is an increased use of less hazardous substitutes.

Policies introduced by many international, multilateral, and bilateral organizations on regulating pesticide distribution, reducing pesticide use, and promoting integrated pest management (IPM) have supported the efforts of governments in the region. The development of the Food and Agriculture Organization's (FAO's) International Code of Conduct on the Distribution and Use of Pesticides has greatly helped with the process.

This paper presents an overview of the pest management policies, pesticide use, and regulatory processes in Indonesia, India, the Philippines, Nepal, Sri Lanka, Thailand, China, and Vietnam. The paper is based primarily on data and information collected as a result of work on three regional projects in Asia.¹ In addition, highlights of Japanese and Korean pesticide policies that regulate the entry of agricultural commodities from neighboring countries are presented.

¹ The projects were:

- Support for the Implementation of the International Code of Conduct on the Distribution and Use of Pesticides (FAO, GCP/INT/457/JPN; 1988-1993);
- UNDP/UNIDO Regional Network on Pesticides for Asia and the Pacific (U.N. Industrial Development Organization, 1981-present); and
- Technical Assistance for the Preparation of the *Handbook on the Use of Pesticides in the Asia-Pacific Region* (Asian Development Bank, 1987).

SECTION TWO

PEST MANAGEMENT POLICIES AND PESTICIDE USE

PEST MANAGEMENT POLICIES

In efforts to improve agricultural productivity and combat crop losses, countries must rely on pest control measures. Until a decade ago, there was heavy reliance on pesticides as the most convenient and effective method to protect crops against pests. In addition to reports of poisonings and pesticide residues, the development of pest resistance to pesticides, which resulted in even greater crop losses, became a major concern among farmers. Integrated Pest Management evolved as a sound concept for plant protection. In theory, IPM is a pest management system that utilizes all suitable methods and techniques in as compatible a manner as possible to maintain the pest population at a level below that causing economically unacceptable damage or loss.²

As practiced in many countries, IPM implies a need-based application of pesticides in the context of the best mix of control methods, in such a manner that there is no sole reliance on any one method for a prolonged period of time. The decision to use pesticides depends on the determination of the magnitude of the pest problem, using sound methodology for pest intensity assessment and sampling.³

Many countries in Asia have accepted the concept of IPM and have adopted it as the plant protection policy of the country (see Annex A). Although emphasis has been on rice, several countries have started to implement IPM on vegetables and other crops. The plant protection infrastructure needed to implement IPM is in place in most of the countries. In the countries selected for this paper, there is an ongoing program to establish economic thresholds and to train farmers in scouting for pests. In addition, there is a continuous search for and sharing of information on biological control agents — predators and parasites known as beneficial species.⁴ IPM technology has reached different levels of development and implementation for different crop-pest combinations in the region, and the technology will continue to improve.

PATTERNS OF PESTICIDE CONSUMPTION AND USE

Rice is the most important crop in Asia; it is the staple food in all eight countries reviewed. The principal pest problems associated with the rice crop are stem borers and plant hoppers. Cotton is one of the main crops in India, where the bollworm complex and aphids are the common pests. Tea is the major export crop of Sri Lanka, where weeds are a common problem. Bananas and pineapples are important plantation crops and contribute to the export earnings of the Philippines; Sigatoka disease is

² Article 2, FAO Code of Conduct

³ Teng, CACP, 1988

⁴ Waage, Asian Development Bank (ADB) Symposium, 1989

prevalent in bananas. Vegetables and fruits are among the major export crops of Thailand and Indonesia. Diamond back moth, pod borers, aphids, and cut worms are some of the common pests.

The 1990 estimate of the pesticide market for the eight countries under review was about US\$2.0 billion, with China accounting for at least 50 percent of the market, followed by India at 16 percent and Indonesia at 10 percent. Insecticides constituted 76 percent of the market, followed by herbicides at 13 percent and fungicides at 8 percent.⁵ The bulk of the insecticides is used on rice, cotton, and vegetables; the herbicides are used mostly in plantations; and the fungicides are used in the control of diseases in fruits and vegetables.

In adopting an IPM policy, the long-range goal of many countries included the reduction of actual usage of pesticides. So far, a decline has been noted in the amount of insecticides used, especially against rice pests. Except for India, which still uses BHC in agriculture, the countries in the study have banned the use of organochlorines in agriculture. DDT is still used in many countries, but only for malaria control programs under supervision of the respective Ministries of Health.

The use of herbicides is increasing, because of their convenience and because of increased costs and labor shortages associated with weeding by hand. Fungicides and plant growth regulators are also increasing in use, especially against horticultural pests. This is partly because of the development of the horticultural export trade, which supports the need to increase hectareage and production capacity.⁶

Cost is a major consideration in the choice of pesticides. The most widely used chemicals are the oldest ones: butachlor, carbaryl, carbofuran, EBDC (maneb, mancozeb, propineb, zineb), 2,4-D, diazinon, dimethoate, endosulfan, fenitrothion, malathion, monocrotophos, and methamidophos.⁷

PESTICIDE INDUSTRY AND PRODUCTION

The pesticide industry in each country, except China and Vietnam, is run by the private sector and is dominated by local companies representing major multinational corporations. A trade association composed of pesticide distributors and manufacturers has been formed in each country, closely affiliated with the International Group of National Associations of Manufacturers of Agrochemical Products (GIFAP).

India, Indonesia, and China manufacture technical-grade pesticides, but most Asian countries import the bulk of their technical materials and formulate the finished products locally. The sources of technical materials and finished products are usually basic manufacturers from Japan, the United States, and Europe. There is very little trade of pesticides among the eight countries reviewed. The main reason for this dearth of trade is the difficulty in complying with registration requirements and quality standards.

⁵ Extrapolated from 1988 figures (RENPAZ Gazette, 1991) and from recent interviews of regulatory officials in some of the countries

⁶ Food & Horticulture Industries, 1994

⁷ FAO Specifications Workshop, 1989

SECTION THREE

REGULATORY PRACTICES AND PROCEDURES

Increased awareness of the hazards posed by the use of pesticides resulted in government initiatives to control their use through regulations and registration systems. At some point in time over the past 15 years, each country promulgated legislation governing the registration and use of pesticides. The legislation and the corresponding rules and administering authorities for each country are presented in Annex B.

LEGAL REQUIREMENTS AND BASIC INFRASTRUCTURE

The pesticide legislation and regulations in the countries share the following basic concepts:⁸

- Submission of application to register for pesticide use, with required data and other information, and a draft of a label;
- Formation of a Technical Advisory Committee to assist in the evaluation of scientific data submitted for registration;
- Appointment of inspectors or officers to monitor and enforce the law; and
- Control of imports and restrictions on availability.

India has provisions for training on the safe use of pesticides and for using laboratory facilities for regulatory purposes. India, the Philippines, and Thailand have provisions for licensing of handlers. The legislation in Thailand covers all hazardous substances, not only pesticides. China has no legislation at present, but regulates pesticides under a set of ministerial regulations.

In each country except Thailand, pesticide registration and control is under the Ministry of Agriculture. In Thailand, the responsibility is shared equally among the Ministries of Agriculture, Health, Industry, and Defense, depending on a pesticide's use. Although all the countries have the basic infrastructure to operate a registration system, Nepal, Sri Lanka, and Vietnam need to greatly improve their analytical facilities in order to better support the system.

⁸ FAO Harmonization Workshop, 1990

REGISTRATION PROCEDURES AND DATA REQUIREMENTS

The procedures followed by all countries in registering pesticides are similar.⁹ An application is submitted with the relevant data and is reviewed by a Technical Advisory Committee; then, regulatory action is recommended.

The data requirements are generally similar — chemical and physical properties, toxicology, efficacy, residues, and fate in the environment. However, the type of information required may vary according to the needs of the country and its available expertise. For example, India requires submission of scientific studies, the Philippines accepts summaries of studies, and China may accept simple product information.

In general, registration systems start with requirements for local efficacy trials and expand to other locally generated data, such as residues in local crops (especially those intended for export), fish toxicity, and acute toxicity of formulations. At present, all eight countries require local efficacy data, some require local residue data, and a few require local fish toxicity studies. All countries accept toxicology data from the basic manufacturer. India, however, may require additional data on toxicology and environmental effects for products manufactured locally. Waivers on some of these data requirements may be given, depending on the circumstances.

DATA ASSESSMENT AND REGISTRATION DECISIONS

In all the countries except Nepal and Vietnam (which have not yet fully implemented a registration system), a technical committee reviews the information provided and makes a recommendation to the Minister of Agriculture for registration of the product. The recommendation of this committee is usually endorsed by the Minister. Because the available expertise in the region is on the subject of efficacy, the emphasis is on evaluation of data on efficacy, with minimal or no assessment of toxicological risks. Committees rely heavily on reviews and, to a large extent, on regulatory decisions in developed countries. Environmental impact of pesticide use is rarely assessed, because of the lack of expertise in this area.

LABELING REQUIREMENTS

The labeling requirements of the countries implementing a registration system are almost completely harmonized, based on relevant FAO guidelines.¹⁰ All countries require the printing of labels in both the national language and the dialect of the locality where the material is used. Legibility of the print is a common problem. To facilitate monitoring of compliance, all countries operating a registration system print the registration number of the product prominently. Many have imposed the use of color codes, based on the hazard classification system recommended by the World Health Association. Some countries have also incorporated the use of pictograms, as suggested by FAO.

⁹ FAO Harmonization Workshop, 1990

¹⁰ FAO Labeling Workshop, 1990

ENFORCEMENT MECHANISMS

All registration schemes provide for the appointment of inspectors or equivalent officers to monitor and enforce legislation and regulatory policies of the country. These officers are vested with varying degrees of authority, including the powers to enter establishments dealing with pesticides, withdraw samples for analysis, and seize products suspected of violating any law. A problem encountered in many countries, because of limited government resources, is the dearth of compliance officers. Where compliance officers exist, they often lack training to perform their responsibilities effectively. In general, enforcement of pesticide regulations is very weak or non-existent among the developing countries in Asia.

MONITORING AND TRAINING PROGRAMS

All of the countries carry out some form of monitoring and training aimed at improving industry compliance with regulations and promoting the safe handling and judicious use of pesticides.¹¹ Many international, multilateral, and bilateral organizations have assisted the developing countries in Asia in this regard, by providing technical assistance and training or by strengthening facilities through provision of equipment and laboratory supplies.

BANNED AND RESTRICTED PESTICIDES

Regulations in each country allow the government to limit the availability and use of the more toxic pesticides, either by banning a product completely or by restricting its use to a trained group or to a specific, targeted application. A review is made of the toxicity of a product, its use pattern, and the availability of less toxic and economically comparable substitutes. In most developing countries in Asia, the decision to restrict or ban a pesticide is strongly influenced by decisions made in developed countries, particularly the United States, Japan, or countries in Europe. In addition, many developing countries in Asia are reviewing the prior informed consent (PIC) procedures of the Joint U.N. Environment Programme (UNEP)-FAO Secretariat, with the objective of banning or restricting use of pesticides.

Among the pesticides banned in a majority of the countries are aldrin, dieldrin, endrin, DBCP, leptophos, HCH mixed isomers, ethylene dibromide, fluoroacetamide, mercury compounds, chlordimeform, dinoseb, parathion-ethyl, and 2,4,5-T.¹² Among those restricted are chlordane and heptachlor (for use only in termite control) and DDT (for use only in malaria control programs).

¹¹ ADB Workshop, 1989

¹² ADB Manual, 1989; FAO PIC Workshop, 1991

SECTION FOUR

PESTICIDE REGULATORY POLICIES ON IMPORTS OF AGRICULTURAL COMMODITIES IN JAPAN AND KOREA

Japan is the principal export market for exported agricultural commodities from many countries in Asia, and Korea is not far behind. In the past, some countries have met with difficulties in their exports to these countries, for various technical reasons, including excessive residues, use of pesticides not allowed for certain crops, and mislabeling. It is important to have an understanding of the regulatory policies of a country before attempting to export commodities to that country. A brief summary of some of these policies is presented below.

JAPAN

A key element of Japan's food safety program is the assurance that imported foods do not contain pesticide residues over the maximum residue limit (MRL) or tolerance. Japan has increased its emphasis on pesticides, increasing the number of pesticide residue tolerances for imported foods and increasing the resources devoted to ensuring that imported foods meet the established tolerances. Over the past two years, Japan has more than doubled the number of pesticide chemicals on which tolerances are established for imported foods. Currently, 73 pesticide chemicals have tolerances for one or more of about 130 fruits and vegetables. When tolerances do not exist, Japan may use a tolerance established by the Codex Alimentarius Commission, or it may elect to use the tolerance of the exporting country.

Inspection of imported foods is the responsibility of the Ministry of Health and Welfare. Inspection is directed by the Ministry's Office of Port Health Administration, within the Food Sanitation Division of the Environmental Health Bureau. Pesticide residue testing is usually conducted by one of the Ministry's two large laboratories, located in the Tokyo metropolitan area and in the Osaka area. Technical assistance and guidance to the Ministry in the establishment of pesticide tolerances are frequently provided by the Division of Foods, within the Institute of Hygienic Sciences.

Activities relating to plant pest and disease control are carried out through the Plant Protection Division, within the Agricultural Production Bureau of the Ministry of Agriculture, Forestry and Fisheries.

KOREA

The Ministry of Health and Social Services is responsible for food safety in Korea. The import and export of most food products is subject to the Food Sanitation Act. Under the Act, the Ministry monitors pesticide residues in all foods, including agricultural commodities such as fresh fruits and vegetables. The Ministry sets the maximum residue limits of agricultural commodities for human consumption, in close consultation with the Rural Development Administration and the Ministry of Agriculture. A limited number of MRLs has been set to date. As in Japan, when MRLs or tolerances do not exist, Korea may allow the use of accepted Codex MRLs.

Previous Page Blank

In general, the National Institute of Health, which is under the Ministry of Health and Social Services, inspects for pesticide residues in foods, whether imported or locally produced. However, the capacity of the Institute is limited. Consequently, it does not perform regular and formal inspections for all food items, but instead assigns some inspections to other specialized institutions. One of these institutions is the Agricultural Chemicals Research Institute of the Rural Development Administration, under the Ministry of Agriculture. This Institute monitors pesticide residues on agricultural commodities that are locally produced or imported.

The National Plant Quarantine Office, under the Ministry of Agriculture, has recently been empowered to inspect for pesticide residues on imported agricultural commodities. As with the National Institute of Health, the Quarantine Office has limited capacity for this work and, as a result, cannot check all imported agricultural commodities. Instead, a random check is done on selected items. In special cases, and when requested, the National Institute of Health also inspects for pesticide residues in imported agricultural commodities.

In consultation with the Rural Development Administration, the Ministry of Environment sets the guidelines for pesticide residues in soil and water, pursuant to the Environment Protection Act. The Ministry of Agriculture, Forestry and Fisheries is responsible for pest and disease control, including pesticide registration. This Ministry sets the guidelines for the safe use of pesticides in Korea, in accordance with the Pesticide Management Act.

SECTION FIVE

COUNTRY PROFILES

This section presents the important aspects of pest management, pesticide use, and regulatory policies and procedures in India, Indonesia, Nepal, the Philippines, Sri Lanka, Thailand, China, and Vietnam. The information presented on pesticide regulatory practices is current and is based on the latest evaluation, conducted in 1993 through a recently concluded FAO project, Support for the Implementation of the International Code of Conduct on Pesticides. Recent telephone interviews also contributed to the information in this section.

The industry information is based on extrapolations from the latest available figures (for 1988) provided by the RENPAP Gazette, 1991. RENPAP, the Regional Network on Pesticides for Asia and the Pacific, based in India, collects data on pesticide imports, production, and prices for Asia.

INDIA

Pest Management and Pesticide Use

In the early 1970s, to achieve self-sufficiency in food and increase yields of export crops, India embarked on a program of intensified agricultural production. The program used high-yielding crop varieties that required considerable use of chemical inputs. The universities and research stations throughout the country evaluated and recommended pesticides to suit varied cropping and climatic conditions in the different states. The technology was transferred to farmers through the extension services of the states. However, the problems associated with the use of pesticides prompted the Government of India to shift to alternative pest control methods and, in the mid-1980s, India adopted IPM as its plant protection policy. IPM is being implemented in rice-growing areas and is expanding into vegetable production, using the extension services of the states.

Pesticide use, however, is still expected to increase at approximately 2 percent per year, with insecticides accounting for 75 percent of the consumption. Sixty percent of the insecticides used are older organochlorine products. The use of herbicides, especially in wheat, is expanding. Pesticides are used mainly on cotton, rice, vegetables, and plantation crops. The key pesticides used are BHC, DDT, malathion, endosulfan, parathion-methyl, mancozeb, copper oxychloride, butachlor, phorate, phosphamidon, carbaryl, dimethoate, and monocrotophos.

Pesticide Industry and Production

The pesticide industry in India is made up of government corporations, private sector companies, foreign subsidiaries, and small industries. The industry is represented by three organizations: the Pesticide Association of India, the Federation of Associations of Small Industries, and the Association of Basic Manufacturers of Pesticides. Pesticides are distributed through a multichannel network of state departments of agriculture, private trade organizations, and other agro-industry organizations.

India has the 10th largest industrial output in the world; within India's chemical sector, pesticides account for about 3 percent of total chemical production. India is now almost self-sufficient in pesticide production, importing less than 10 percent of the technical materials needed. The latest available production figures (for 1988) show a total output of 64,000 metric tons of technical materials, valued at US\$213 million, 89 percent of which were insecticides. All the key pesticides listed above are produced locally, with BHC, a popular insecticide among marginal farmers, accounting for 42 percent of the production.

India has also developed an export market for pesticide products. Pesticide exports amounted to approximately US\$52.7 million during the first nine months of fiscal year 1993, up 45 percent from the same period in fiscal year 1992. The major products exported were endosulfan, lindane, aluminum phosphide, isoproturon, and cypermethrin.¹³

Pesticide Regulatory Policies and Procedures

The Insecticides Act of 1968 regulates the import, manufacture, sale, transport, distribution, and use of insecticides. Under the Act, the word "insecticides" includes herbicides and fungicides. The Insecticides Rules of 1971 supplement the Act. Several agencies implement the Act:

- The Central Insecticide Board advises the central and state governments on matters related to the Act;
- The Pesticide Registration Committee handles all registration matters;
- The Central Insecticides Laboratory verifies all claims on product specifications; and
- The Pesticides Environmental Pollution Advisory Committee reviews the environmental impacts of pesticides and suggests remedial measures when necessary. An IPM strategy group has also been formed to develop less toxic alternatives to pesticides.

The registration procedure requires that products first be scheduled as insecticides. The registrant submits required data to the Central Insecticides Board, which sends the data to the Registration Committee, which in turn refers the data to specialized expert committees on insecticides, fungicides, and herbicides for evaluation. A draft label is also approved. A certificate is granted as proof of registration. This certificate is required before any pesticide can be imported to or manufactured in India.

The Act provides for the appointment of inspectors to enforce its provisions, but there are not enough of these officers to cope with the volume of work entrusted to them. Thus, enforcement is lax and compliance with label directions is almost non-existent. The government realizes this constraint and has encouraged the industry to assume responsibilities under the Code of Conduct and to embark on training programs and education campaigns on the safe and efficient use of pesticides.

The regulation of pesticides is influenced by the government policy to develop the agricultural and industrial sectors. The agricultural sector aims for increased food production without sacrificing human health and the environment and, thus, has adopted IPM as its pest control policy, which should eventually result in less reliance on pesticides. The industrial sector, on the other hand, continues to

¹³ *AGROW* No. 180, 1993

develop its pesticide manufacturing capacities with the aims of making India self-sufficient in pesticides and expanding the export market. Most pesticides used and manufactured are the older, more persistent, and highly hazardous products.

The pesticides banned in India are endrin, ethion, parathion, calcium arsenate, lead arsenate, carbophenothion, azinphos-methyl, EPN, 2,4,5-T, mephosfolan, azinphos-ethyl, binapacryl, dicrotophos, disulfoton, nitrogen, and leptophos.

INDONESIA

Pest Management and Pesticide Usage

Food sufficiency is a major government objective, as evidenced by the adoption of improved crop production and protection technologies. The economically important crops in Indonesia are rice, vegetables, rubber, coconuts, coffee, and oil palm. In 1985, Indonesia shifted from importing rice to exporting rice.

The major pest in rice is the brown planthopper, which has developed several biotypes and has caused extensive crop losses. Tungro, a viral disease transmitted by green leafhoppers, is still an important concern, and rice blast is a perennial problem in the lowland areas. In addition, rodents cause extensive damage to crops and stored products.

In 1976, pest surveillance and early warning programs were initiated in rice-growing areas. In theory, these programs emphasized the need to use pesticides judiciously, while identifying and developing natural enemies as biological control agents. In practice, the brown planthopper, gall midge, and rat populations were surveyed, but pesticides, which were readily available at subsidized costs under the Intensive Program in Rice Growing Areas/Less Intensive Program in Rice Growing Areas (the BIMAS/INMAS program), remained the main control measures.

Although surveillance and pest control methods were relatively successful, the deleterious effects of pesticides, coupled with the emergence of pesticide-resistant species, especially the brown planthopper, precipitated a shift of government policy in 1986 from pesticide subsidy programs to IPM. In November 1986, the Government of Indonesia issued a directive prohibiting the use of 52 pesticides in the rice production program. At the same time, the government phased out the BIMAS/INMAS subsidy program, which was the source of 75 percent of the pesticides to farmers.

Indonesia has been the showcase for successful IPM implementation. IPM programs resulted in significant decline in insecticide use in rice-growing areas. In 1991-1992, severe drought added to this decline in use, but the industry projects a slight increase in the total market for pesticides in 1994-1995, mostly from an increase in herbicide and fungicide usage in estate crops. The important pesticides in Indonesia are carbofuran, BPMC, diazinon, dalapon, and phenthoate.

Pesticide Industry and Production

With the termination of the BIMAS/INMAS program, the pesticide industry in Indonesia is now principally controlled by the private sector, which has formed the Pesticide Industry Association.

In 1985, government plants started production of technical materials; in 1988, about 5,000 metric tons of material were produced, of which 4,900 metric tons were insecticides. Seven technical materials have since been produced: diazinon, BPMC, MIPC, carbofuran, monocrotophos, glyphosate, and ethepon. Indonesia has lately become an exporter of pesticide technical material and formulations to other countries in Asia and has been able to minimize its imports of pesticides, in line with the government policy of self-sufficiency and development of local industrial capacity. The key exports are diazinon, BPMC, and MIPC.

Pesticide Regulatory Policies and Procedures

Regulation of pesticides in Indonesia started as early as 1973, when Government Decree No. 7 was enacted to regulate distribution, storage, and use of pesticides. The Decree is implemented by the Ministry of Agriculture, which is responsible for general registration procedures and pesticide use. The Ministry of Trade supports the process through its control of imports and distribution; the Ministry of Public Health and Manpower is responsible for issues related to public and occupational health. Subsequent Decrees from the Minister of Agriculture provided the working guidelines for the implementation of a registration scheme. These include Decree No. 289, of June 1973, on pesticide registration procedures; Decree No. 429, of September 1973, on pesticide labeling and packaging; and Decree No. 944, of November 1984, on the limitation of the number of pesticides registered.

The legislation and registration system is generally similar to the FAO guidelines, but implementation has been adapted to availability of local expertise and facilities. All pesticides must be registered prior to commercial distribution, sale, and use. Only local companies engaged in pesticide manufacture and formulation, as well as local representatives of foreign manufacturers, are allowed to register pesticides. All intended uses and all types of formulations must be registered.

The registration procedure involves submission of an application with the required data (as outlined in the FAO Guidelines on Registration) and a sample of the formulation to the Secretary of the Pesticides Committee. The Pesticides Committee reviews the application and makes a recommendation to the Minister of Agriculture on the type of clearance to be granted. Indonesia has a phased registration system and grants three types of clearances, depending on the amount of data available at the time of submission:

- Experimental use clearance, allowing the use of the pesticide in experiments for one year;
- Provisional clearance (for those pesticides determined as relatively safe for public use), allowing use for one year at limited commercial quantities; and
- Permanent clearance, valid for five years and renewable upon payment of appropriate fees. Permanent registration is not granted until completion of efficacy field trials.

Local data on efficacy, fish toxicity, acute or subchronic mammalian toxicity, and residues may be required, depending on the type of product and the proposed uses. Although data from other sources may be used as reference points, only data collected by government institutions are acceptable for registration.

Products proposed for use on irrigated rice must be tested for toxicity to fish under both laboratory and field conditions. Local residue data may be required, if conditions warrant. When no

toxicological data on formulations are available or when extrapolation is not possible, local toxicity tests may be required.

Data evaluation is done by the Pesticides Committee, but, because the expertise is concentrated on efficacy, assessment is focused on efficacy. Very minimal toxicological and environmental impact assessments are conducted. The label must conform with Indonesian standards. All restricted pesticides should contain labels printed on a reddish or pink background. The date of manufacture is required on all labels.

Imports of all pesticides, including inert ingredients, must be accompanied by an import license, which is issued only if the product has been registered. The Minister of Trade grants this license on the basis of a letter from the Pesticides Committee. As in other countries, the law provides for appointment of inspectors to enforce the regulations. However, enforcement is generally weak. The government realizes this, and regularly organizes monitoring and training programs on safe application and use of pesticides. In addition, the Ministry of Agriculture has established a Committee on Pesticide Control, to strengthen enforcement at the provincial and district levels.

As stated earlier, Indonesia banned 52 pesticides, mostly organophosphates and organochlorines, for use in rice-growing areas. The list of banned pesticides includes BHC, EDB, toxaphene, and 2,4,5-T. Chlordane, dicrotophos, dieldrin, methamidophos, methyl bromide, monocrotophos, and paraquat are restricted to specified uses by licensed applicators.

NEPAL

Pest Management and Pesticide Use

The agricultural sector in Nepal is in the early stages of development. Although pest outbreaks have been a problem, there is minimal effort directed toward crop protection. The National Agricultural Research Center was established in the late 1980s to concentrate on crop production and protection measures. Work involves identification of pests, field experimentation, research on appropriate plant protection measures, technology transfer to farmers, training on safe use of pesticides, and IPM training.

The principal crops are rice, maize, wheat, oilseeds, and jute. Yields of the major crops are generally low, but this may be because of climate, small-scale farms, and the use of traditional farming practices. All crops are prone to infestations from a wide range of pests. Pesticides are used as needed, usually at minimal doses. Insecticides dominate the market and are distributed through the following channels:

- The Ministry of Health, which uses the bulk of DDT and malathion to control malaria;
- The Ministry of Agriculture (through the Agricultural Inputs Corporation), which accounts for 35 percent to 50 percent of the market; and
- The private sector, which is represented by manufacturers based in India that supply Nepal through local dealerships.

Pesticide Industry and Production

The principal pesticides used are parathion-methyl, carbofuran, malathion, fenitrothion, and demeton-methyl. The Nepal Pesticide and Chemicals Company formulates BHC, but operates only occasionally, because the demand is low.

Pesticide Regulatory Policies and Procedures

Nepal has accepted the IPM concept and is currently implementing IPM in rice-growing areas. Realizing that pesticides will continue to be used when pest outbreaks occur, the government decided to regulate the import, distribution, and use of these products by promulgation of the Pesticides Act in 1991. This Act, however, has not yet been implemented, although the Department of Plant Protection, under the Ministry of Agriculture, has been given the responsibility for implementation when organizational issues are resolved and when a Registrar has been selected. The Asian Development Bank has just completed the technical assistance package to Nepal (1989-1993), through which this Act was prepared and approved by the Government of Nepal.

PHILIPPINES

Pest Management and Pesticide Use

Agricultural production in the Philippines has increased considerably through improved technology and the use of high-yielding varieties of rice. On occasion, the country has attained self-sufficiency in rice; pesticides have played an important role in boosting yields.

Rice, corn, and vegetables are important food crops, and bananas, pineapples, tobacco, and coconuts are major export crops. About 40 percent of the insecticides used in the Philippines are applied to rice and 20 percent to vegetables. Herbicides are used mainly for plantation crops — bananas, pineapples, and sugar cane. Fungicides are used extensively for control of diseases in bananas and vegetables.

The 1990 Philippine pesticide market was estimated at US\$100 million, of which 55 percent went to insecticides, 20 percent to fungicides, and 17 percent to herbicides. Although the use of less persistent and relatively safer chemicals has increased, marginal farmers still rely on the cheaper, broad-spectrum, older pesticides. The key pesticides used are monocrotophos, phenamiphos, tridemorph, butachlor, chlorothalonil, mancozeb, endosulfan, azinphos-ethyl, and parathion-methyl.

In 1990, the Philippines officially adopted IPM as its plant protection policy. In the current five-year plan, IPM is a prominent program supported by considerable resources from the Department of Agriculture. Emphasis has been on IPM programs for rice (particularly against brown planthoppers), but the trend is to implement the program in vegetable-growing areas as well. As a result, the volume of insecticide use in rice has decreased considerably, even if the use of herbicides, fungicides, and other chemicals has increased.

Pesticide Industry and Production

The pesticide industry is controlled by the private sector and is dominated by local organizations representing major multinational companies. The companies in the trade association Agricultural Pesticide Institute of the Philippines transact virtually all pesticide business in the country.

There is only one technical-grade manufacturing company. It produces phenoxy herbicides (2,4-D and MCPA acid) from intermediates. The rest of the technical materials are imported from basic manufacturers abroad and are formulated by local plants. Emulsifiable concentrates are the most popular formulations used by farmers.

Pesticide Regulatory Policies and Procedures

Presidential Decree 1144 of May 1977 created the Fertilizer and Pesticide Authority (FPA) to regulate the import, manufacture, distribution, sale, and use of fertilizers and pesticides in the Philippines. The implementing Rules and Regulations, No. 1, were immediately issued to initiate a registration system. The provisions of the law are generally the same as those outlined by the FAO Guidelines on Legislation; they include forming the Pesticide Technical Advisory Committee; establishing requirements for registration and labeling, establishing requirements for licensing handlers, certifying pest control operators, controlling imports, and controlling availability of toxic products.

Under the registration scheme, an application, a data package, samples of the technical material, the formulated product, and an analytical standard are submitted to the authority. The data package is reviewed by experts drawn from universities and research institutes, who present their findings to the Pesticide Technical Advisory Committee. The Committee makes a recommendation to the administrator of the Fertilizer and Pesticide Authority, who issues the registration. The labeling requirements include the use of color codes for hazards, as recommended by the World Health Organization. The industry has voluntarily used the recommended pictograms on the labels.

Comprehensive data evaluation is done on the efficacy of the product; however, because of limited expertise on studying toxicological data, there is still heavy reliance on risk assessments abroad. Occupational health issues are fairly well studied, and extrapolation to local conditions is made for key pesticides formulated locally.

The enforcement of regulations is poor because of the lack of resources and manpower, but control of imports is exceptionally good. For each shipment of pesticides, an import permit (granted only if the product has been registered or allowed for experimental use) from the Fertilizer and Pesticide Authority is required for the importer to get approval from the Central Bank, which will issue a letter of credit, and from Customs, which will release the goods when they arrive. A good system of coordination exists between these two entities.

The following pesticides have been banned in the Philippines: parathion-ethyl, leptophos, DBCP, nitrogen, EPN, endrin, mercuric fungicides, and toxaphene. DDT is used only for control of malaria and is imported directly by the Department of Health. Pesticides restricted to institutional and plantation use are paraquat, phenamiphos, and ethoprop. Heptachlor and chlordane are for use only by trained pest control operators and only for termite control. Under the prior informed consent procedure, the Philippines is reviewing pesticides such as monocrotophos, endosulfan, parathion-methyl, and methamidophos for possible phase-out and banning.

SRI LANKA

Pest Management and Pesticide Use

For more than a century, Sri Lanka has been one of the world's most famous producers and exporters of tea. Rice is the staple food crop in Sri Lanka. Maize, root crops, pulses, and chili peppers also are major food crops, and rubber and coconut are other important export crops.

The extensive and indiscriminate use of pesticides, resulting from government-imposed targets to increase yields through improved production, led to import restrictions. When these restrictions were lifted in 1977, the use of pesticides increased dramatically. Although pesticides remain the preferred means of pest control by farmers, IPM has been adopted as the plant protection policy, and the Department of Agriculture has implemented IPM in 13 districts.

The use of pesticides in Sri Lanka is relatively small, but it has increased from about 2,000 metric tons in 1980 to 8,000 metric tons in 1990. Of the pesticides used, 50 percent are insecticides and 40 percent are herbicides. Pesticides are used mainly on food and cash crops such as rice, vegetables, cotton, tobacco, and chilies. Insecticides are used mostly on rice, herbicides are extensively used for tea and rubber, and fungicides are used for vegetables. The key pesticides used are monocrotophos, methamidophos, carbofuran, BPMC, carbaryl, diazinon, paraquat, propanol, 2,4-D, and MCPA.

Pesticide Industry and Production

Public and private companies compete in Sri Lanka's market. Imports of formulated products and technical grade materials, as well as local formulation of pesticides, are carried out by both the private sector and the Ceylon Petroleum Corporation, a government parastatal institution engaged in the import, formulation, and distribution of pesticides. An industry trade association, the Pesticides Association of Sri Lanka, has been working on training programs for the safe use of pesticides.

All technical-grade materials used in Sri Lanka are imported. However, local formulation plants produce up to 60 percent of the pesticides used in the market.

Pesticide Regulatory Policies and Procedures

The 1980 Control of Pesticides Act No. 33 regulates the import, packaging, labeling, storage, formulation, transport, sale, and use of pesticides. Additional legislation — Regulation 263/17 of 1983 on the prescribed fees, and Regulation 347/7 of 1985 on label requirements — supplement the Act. The Act is administered by the Registrar of Pesticides under the Ministry of Agriculture. The basic provisions include the appointment of a Pesticide Formulary Committee, as an advisory body; the appointment of authorized officers for enforcement; the designation of authorized analysts; the control of imports; and requirements on residue limits.

All pesticides must be registered prior to sale and use in Sri Lanka. The scheme is simple and is run by a limited number of staff. The data requirements for submission are the usual — data on chemistry, efficacy, toxicology, and residues. The data and an application form are submitted to the Registrar. The efficacy data are sent to an expert, and the Committee is consulted for advice. Once the

Registrar is satisfied that the product is effective and that there are no toxicological problems, a registration is granted.

Efficacy data must be generated locally in government research stations. Because virtually no evaluation is done, except for efficacy, minimal data are needed for other aspects. Decisions made in other countries form a strong basis for regulatory decisions in Sri Lanka.

As in other countries in Asia, although the law specifies appointment of enforcement officers, limited resources do not allow this to happen and, thus, enforcement suffers. Limited analytical facilities and a dearth of trained personnel make it difficult to run a sound registration system. Imports of pesticides are strictly monitored, and a permit from the Registrar is required for each shipment.

The pesticides banned in Sri Lanka are DDT, endrin, parathion, leptophos, and 2,4,5-T. Pyrethroids are allowed only for cotton and onion crops, because of the potential for pest resistance problems.

THAILAND

Pest Management and Pesticide Use

Thailand is primarily an agricultural country, and improved crop production and protection have made it a large exporter of rice, cassava, maize, and other crops. Pesticides constitute the most popular means of crop protection, although more programs on IPM have been introduced. A government policy that encourages competitive pricing of inputs, including pesticides, and that encourages farmers' reliance on such inputs, has resulted in a steady increase of pesticide use.

The important crops in Thailand are all prone to pest infestations: brown planthoppers and stemborers on rice, locusts and corn borers on maize, diamond back moth on maize, and jassids and bollworms on cotton. The primary users of pesticides are farmers engaged in rice, vegetable, and cotton production, accounting for about 60 percent of total pesticide consumption. Herbicides are used principally on plantation crops, and fruits and vegetables dominate the fungicide market. The most popular pesticides used in Thailand are 2,4-D, paraquat, dalapon, parathion-methyl, atrazine, monocrotophos, and dimethoate.

Pesticide Industry and Production

There are two pesticide industry trade associations — the Thai Pesticide Industry, made up of representatives from multinational companies, and one other, made up of local formulation companies. Except for a small quantity of paraquat, all technical materials are imported and formulated into finished products. Local production supplies about 40 percent of the pesticide requirements of the country; the balance is imported from sources in Japan, the United States, and Europe.

Pesticide Regulatory Policies and Procedures

In 1991, Thailand enacted the Hazardous Substances Act, to replace the Poisonous Articles Act of 1973. The change incorporates coverage of all hazardous industrial substances not previously covered,

including those used by the military. The Act gives responsibilities to Ministries to regulate hazardous substances falling under their jurisdiction — pesticides used for agriculture, under the Ministry of Agriculture; those for consumers and household use, under the Ministry of Health; those for industrial uses, under the Ministry of Industry; and those related to the military, under the Ministry of Defense.

Under the Act, each Ministry has the power to promulgate its own regulations. The Ministry of Agriculture is awaiting approval of a Ministerial Decree drafted to implement the pesticide registration system under this Act. In the meantime, the old system is being followed, and registrations are granted pursuant to the 1973 Act.

Recently, locally generated data on efficacy have been required. Under the new regulations, efficacy trials should be conducted at government research stations whenever possible. In cases where no government research stations are available, trials may be conducted in previously approved sites, under the supervision of a designated official. Residue studies also are occasionally conducted by the government. Toxicological and environmental fate data are provided by the manufacturers. In many cases, brief statements on the toxicity of the product are sufficient.

A Pesticide Technical Committee has been organized within the Department of Agriculture, to evaluate registration petitions. There is a thorough assessment of efficacy data, but assessments and decisions from abroad are relied upon for toxicology and environmental fate. Under the current system, there are only 10 inspectors appointed to enforce the provisions of the Act, and their responsibilities include collection of samples for the monitoring programs, seizure of unregistered products, and training of dealers. The result of having so few inspectors is that enforcement is weak. The pesticide industry is doing its share in training farmers and dealers on the safe use of pesticides, but problems of misuse persist.

Pesticides banned in Thailand include BHC, chlordimeform, DDT, dinoseb, EDB, endrin, leptophos, sodium arsenite, 2,4,5-T, and toxaphene. DDT is banned for use in agriculture, but is imported and extensively used for control of malaria.

CHINA

Pest Management and Pesticide Use

The Government of China has traditionally controlled and regulated agricultural production and marketing, including the distribution of pesticides. From the 1960s to the 1980s, the use of pesticides increased dramatically, but the amount of imported material remained moderate. The primary pesticides used during this period, DDT and BHC, were locally produced, along with a few organophosphates. In 1983, the government banned BHC and DDT, and newer classes of pesticides have since been substituted.

The major food crops are rice, wheat, corn, and tubers. The most important cash crops are sugar cane, oil crops, fruits, cotton, and tobacco. In addition, several varieties of vegetables are grown for local consumption. The most serious pests are stemborers, planthoppers, and leafrollers in rice; blast, bacterial blight, and aphids in cotton; armyworms and greenbugs in wheat; diamond back moth in vegetables; and mites in apples. Pesticides constitute the principal means of pest control.

A sophisticated early warning system for pest outbreaks links national plant protection stations to local plant protection stations in the field. Surveillance and the early warning system utilize a network

of 1,800 stations. IPM programs have been started on a limited scale, but nationwide implementation will take a longer time to realize.

China accounts for about 50 percent of the total market for pesticides among the eight countries reviewed. Of China's market for pesticides, 90 percent are insecticides. The key pesticides used are DDVP, omethoate, trichlorfon, methamidophos, and dimethoate. Insecticide use is decreasing, whereas herbicide and fungicide use is increasing. The important herbicides are butachlor, benzocarb, and oxadiazon.

Pesticide Industry and Production

Pesticide imports, purchasing, and distribution are regulated by several agencies:

- The China National Agricultural Means of Production Company estimates annual pesticide requirements and is responsible for distribution to farmers;
- The Ministry of Chemical Industry assists local pesticide manufacturers in planning production levels, based on the estimates of the China Agricultural Means of Production Company; and
- SINOCEM does the purchasing of both local and imported pesticides.

Almost all the pesticide requirements of China are filled locally, by more than 200 formulation plants. Complaints of problems with quality of the products prompted the Ministry of Agriculture to institute monitoring programs for pesticide quality. The Ministry of Chemical Industry has also taken steps to improve production standards and has closed several plants that did not meet minimum standards.

Pesticide Regulatory Policies and Procedures

In 1982, the Regulations for Pesticide Registration were promulgated to ensure the protection of health and the environment while the government pursued the goal of self-sufficiency through increased production. All pesticides used in China, including technical and formulated products, fall within the scope of the Regulations. It should be noted that the principal law, the Environmental Protection Act, still has not been approved.

Under the Regulations, the Institute for the Control of Agrochemicals (ICAMA), under the Ministry of Agriculture, is responsible for the registration and control of pesticides in China. In addition, the Regulations established the Evaluation Committee on Pesticide Registration, consisting of experts in pesticide control technology, who represent the Departments of Agriculture, Chemical Industry, Public Health, Environmental Protection, and Commerce and Forestry; the experts are appointed for three-year terms.

The registration scheme requires the submission of an application to ICAMA, with required information on efficacy, chemistry, toxicity, residues, and environmental fate. Efficacy data are derived from two-year trials at two locations, conducted by government-designated institutions. Data are evaluated by the Evaluation Committee on Pesticide Registration.

The six divisions of ICAMA — Agrochemical Regulation, Bioassay, Pesticide Analysis, Pesticide Residue, Information, and Administration — enforce the regulations. Because of the limited number of ICAMA personnel covering the vast agricultural area, and because of the large number of local pesticide manufacturers, distributors, and farmers using pesticides, effective monitoring and enforcement of the regulations are almost impossible.

Imported pesticides may be accepted into China only after they have complied with the registration requirements. All imports of pesticides are based on recommendations from the China National Agricultural Means of Production Company, and all purchasing is done by SINOCEM.

DBCP, DDT, and BHC are banned for production and use. One example of restrictions on use is that, for pesticides classified as highly hazardous based on an acute oral toxicity of LD_{50} , less than 50 milligrams per kilogram may be used on vegetables, tea, fruit trees, and herbal medicines. Another example is that, although chlordimeform may be used for the control of cotton red mites and rice borers, its use is restricted to one application.

VIETNAM

Pest Management and Pesticide Use

The agricultural sector in Vietnam has played the leading role in the transition to a market economy. Economic liberalization began with the realization that, with a population growing faster than food production and national income, Vietnam would soon be in a position where it could not guarantee its own food supply. With the dismantling of the communes and the liberalization of markets, not only has the food supply become adequate, but a surplus has become available for export, propelling Vietnam from a net importer to one of the three leading rice exporters in the world.

Rice is the most important crop, but rubber, peanuts, jute, sugarcane, soybeans, coconuts, coffee, and tea are important industrial crops. The agricultural policy aimed at self-sufficiency in food and development of the export market resulted in intensified production, which led to the use of required inputs, including pesticides.

Learning from the experiences of other countries, Vietnam immediately revised its plant protection policy and adopted IPM as its main program for plant protection. Where pesticides are to be used, the Ministry of Agriculture and Food Industries conducts research and training to guide the farmers on their pest management practices.

The use of pesticides has been reduced during the last four years; this reduction is primarily attributable to the removal of pesticide subsidies. Farmers now have to purchase their own pesticides and are more concerned about their judicious use. The policy with farmers has changed; money for pest control is now provided to farmers directly rather than through a cooperative. Therefore, the farmer has become more selective in pest control methods, resulting in trends toward more effective and less expensive methods to maximize profit.

Pesticide Industry and Production

As in China, the government has control of the import and distribution of pesticides. Private companies are encouraged to enter into joint venture agreements for the production and marketing of pesticides. A plant that produces ready-to-use baits for rodents was established in the 1990s. At present, most pesticides used in Vietnam are imported.

Pesticide Regulatory Policies and Procedures

The Regulations for Pesticide Registration were promulgated in 1992 by the Ministry of Agriculture and Food Industries; the Plant Production and Protection Department (PPPD) became the implementing authority. The National Law on Plant Protection and Quarantine was passed in 1993. The Regulations and the Law outline the procedures for registration, which include submission of an application to PPPD, with information on efficacy, toxicity, and residues. This information is evaluated, and a certificate is granted after payment of necessary fees.

Efficacy protocols have been incorporated into the Vietnamese system. Efficacy trials must be performed at the Plant Production and Protection Stations located in the provinces. Cost and efficacy are the most important factors considered in reaching a regulatory decision. Information on risk from exposure is less important, due to lack of expertise on the subject. It is believed that, through strict regulation and extensive training programs, the risk from the use of toxic pesticides will be minimized. Training on safe use of pesticides has become a vital part of the Ministry's program.

Because most of Vietnam's pesticide imports are those that have been in use for years throughout the world, Vietnamese authorities believe there is information widely available on these products and that there is no need for the registrant to submit it — information on regulatory decisions abroad is considered more useful.

An initial list of banned and restricted pesticides was published in 1992. Among the pesticides banned are mercury compounds, lead compounds, thallium compounds, cadmium compounds, selenium compounds, arsenic compounds, aldrin, BHC, chlordane, DDT, endrin, dieldrin, heptachlor, HCB, toxaphene, parathion-ethyl, and 2,4,5-T. The following pesticides are restricted to trained applicators: aluminum phosphide, carbofuran, dicofol, dicrotophos, dichlorvos, endosulfan, lindane, methamidophos, methyl bromide, monocrotophos, methyl parathion, and phosphamidon.

Recently, a new labeling system has been implemented in accordance with FAO guidelines. Color coding is now used on pesticide labels. In addition, labeling must be in Vietnamese. Because the Ministry of Agriculture and Food Industries is the major formulator, repackager, and retailer of pesticides in Vietnam, the labeling revisions were done uniformly and quickly. Vietnam has two monitoring laboratories, which check product quality and, on occasion, residues on crops.

REFERENCES

- Asian Development Bank (1987). *Handbook on the Use of Pesticides in the Asia-Pacific Region*. Manila, November.
- Asian Development Bank (1989). "Report of the Workshop and Symposium on Strengthening Pesticide Regulations." Manila, December.
- Asian Development Bank (1989). *Training Modules on Strengthening Pesticide Regulations*. Manila, December.
- Food and Agriculture Organization of the United Nations (1989). "Addenda to FAO Guidelines for the Registration and Control of Pesticides." Rome.
- Food and Agriculture Organization of the United Nations (1985). *FAO Guidelines for the Registration and Control of Pesticides*. Rome.
- Food and Agriculture Organization of the United Nations (1985). *FAO Guidelines on Food Labeling Practices for Pesticides*. Rome.
- Food and Agriculture Organization of the United Nations (1989). *FAO Guidelines on Legislation of Pesticides*. Rome.
- Food and Agriculture Organization of the United Nations (1990). *FAO International Code of Conduct on the Distribution and Use of Pesticides (Amended Version)*. Rome.
- Food and Agriculture Organization of the United Nations (1991). "Report: FAO-UNEP/UNITA Regional Workshop on the Implementation of Prior Informed Consent (PIC) in Asia and the Pacific," (Manila). Rome, August.
- Food and Agriculture Organization of the United Nations (1989). "Report: Regional Experts Meeting on Pesticide Specifications and Quality Control," (Jakarta). Rome, December.
- Food and Agriculture Organization of the United Nations (1980). "Report: Regional Workshop on Harmonization of Pesticide Registration Requirements," (Beijing). Rome, May.
- Food and Agriculture Organization of the United Nations (1990). "Report: Regional Workshop on Pesticide Labeling and Advertising," (Chiangmai). Rome, December.
- "Food and Horticultural Industries," *Market Asia*, Vol.1, March/April 1994, Washington D.C.
- "Indian Pesticide Exports Rise." *AGROW* No. 180, March 19, 1993, p. 17.
- Teng, P.S., and H.L. Heong (1988). "Pesticide Management and Integrated Pest Management in Southeast Asia." Consortium for International Crop Protection, U.S. Agency for International Development, Pest and Pest Management Project No. 936-4142.

Previous Page Blank

United Nations Industrial Development Organization (1991). "RENPAP Gazette: Spot Light — Pesticides Data Collection System." *RENPAP Gazette* 1(3), April.

World Health Organization (1993). "Recommended Classification of Pesticide by Hazards." Geneva.

ANNEX A
SUMMARY OF
PEST MANAGEMENT PRACTICES AND PESTICIDE USE

SUMMARY OF PEST MANGEMENT PRACTICES AND PESTICIDE USE

	INDIA	INDONESIA	NEPAL	PHILIPPINES	SRI LANKA	THAILAND	CHINA	VIETNAM
Pest Management Policies	Adopted IPM as national policy; currently implementing IPM on rice, cotton, and vegetables.	Adopted IPM as national policy, with intensified implementation on rice and vegetables.	Initiated IPM program on rice.	Adopted IPM as national policy, with strong implementation on rice.	Implementing IPM on rice, and starting implementation of IPM on vegetables.	Implementing IPM on rice and vegetables.	Implementing IPM on rice, and expanding implementation to horticultural crops.	Adopted IPM as national policy, with implementation on rice.
Trends in Pesticide Usage ¹	Use of pesticides is projected to continue to increase in 1994-1995, with insecticides accounting for about 75% of the total pesticide consumption.	Although severe drought resulted in decline in insecticide and fungicide usage in 1991 and 1992, total pesticide usage is projected to increase slightly in 1994-1995.	Usage of pesticides by farmers is on as-needed basis; it is estimated that the trend will continue and will result in minimal increases in overall pesticide use.	Because of intensified IPM programs on rice and vegetables, insecticide usage is projected to decrease, and herbicide and fungicide usage will increase slightly, resulting in an overall decrease in volume of pesticide usage during the next five years.	Use of pesticides is relatively small, although the estimates show a steady increase from 1988 levels. The main pesticides used are insecticides and herbicides.	A continued increase in overall pesticide usage through 1995 is projected. Insecticide use may decrease slightly, but this would be countered by increases in fungicide use.	Usage of pesticides is projected to increase, with insecticides dominating the market.	Use of pesticides is projected to increase through 1995, with opening of markets to agricultural trade.

¹Based on 1988 data and telephone interviews

	INDIA	INDONESIA	NEPAL	PHILIPPINES	SRI LANKA	THAILAND	CHINA	VIETNAM
Pesticide Production ¹	Produced about 64,000MT of technical materials and 452,000MT of pesticide products in 1988 (mainly insecticides). Production growth potential is 2.9% per year.	Started producing in 1985; by 1988, a total of 4,900 MT of technical materials and about 55,000MT of finished pesticide products were produced.	No manufacture of technical material; one formulation plant produces BHC.	Manufactures 2,4-D technical material; in 1988, manufactured 22,000MT of finished products. Production trends show a decline from 1986 levels.	No local production of technical grade materials, but, in 1988, produced 2,800 MT of finished products, constituting 55% of pesticides used locally.	No local manufacture of technical materials, but about 40,000MT of formulated pesticides were produced in 1988, with projected increase in production through 1995.	Produces about 170,000MT of technical materials and 650,000MT of formulated products per year. About 68% are insecticides.	No local manufacture of technical materials or formulated products.
Import and Export of Pesticides ¹	Imports all minimal — only to meet demand. Major export: (\$8.3 million in 1988): endosulfan, lindane, malathion, zinc phosphide, and aluminum phosphide.	Not a regular importer of technical materials, but exported about \$1.0 million worth in 1988.	Imports pesticides, mainly from India.	Except for 2,4-D, all pesticide technical materials and some formulations are imported.	Imports all technical materials and some formulated products.	Imports all technical-grade materials and a few formulations.	Imports very few pesticides; is looking into exports of finished products.	Imports pesticides from Japan and neighboring countries.

¹Based on 1988 data and telephone interviews

ANNEX B

SUMMARY OF
PESTICIDE REGULATORY POLICIES AND PROCEDURES

SUMMARY OF PESTICIDE REGULATORY POLICIES AND PROCEDURES

	INDIA	INDONESIA	NEPAL	PHILIPPINES	SRI LANKA	THAILAND	CHINA	VIETNAM
Pesticide Legislation/Regulations	Insecticides Act, 1968 (ACT No. 46 of 1968). The Insecticides Rules, 1971.	Government Decree No. 7 (1993). Decree of the Minister of Agriculture on the registration of pesticides (1973). Decree of the Minister of Agriculture on packaging and labeling of pesticides (1973).	The Pesticides Act was promulgated in 1991 but, to date, has not been implemented.	P.D. 1144 (1977). Fertilizer and Pesticide Authority (FPA) Rules and Regulations No. 1, Series of 1977.	Control of Pesticides Act, No. 33 of 1980.	Hazardous Substances Act, 1992 (not yet implemented). Ministerial Regulations on registration of pesticides submitted for approval.	Regulations for Pesticide Registration (1982).	Regulation for Pesticide Registration (1992).
Scope of Legal Authority	Regulation of import, manufacture, sale, transport, distribution, and use of insecticides, fungicides, and herbicides.	Regulation of distribution and use of pesticides through registration process, which includes labeling requirements.	Control of imports, manufacture, distribution, and use of pesticides.	Establishment of the Fertilizer and Pesticide Authority to regulate the import, manufacture, distribution, and use of fertilizers and pesticides.	Establishment of registration system for pesticides, to regulate their import, packaging, labeling, storage, formulation, transport, sale, and use.	Revision of Poisonous Articles Act of 1967 (amended 1973), to expand scope to cover all toxic chemicals for industrial, agricultural, and public health uses.	Establishment of a pesticide registration system, to regulate the use of all pesticides.	Registration of pesticides, to determine which products to allow for general use and which should be banned or restricted in use.

	INDIA	INDONESIA	NEPAL	PHILIPPINES	SRI LANKA	THAILAND	CHINA	VIETNAM
Administering Authority	Ministry of Agriculture, through the Central Insecticides Board and Registration Committee	Directorate of Food Crop Protection, Ministry of Agriculture	Plant Protection Division, Department of Agriculture	Fertilizer and Pesticide Authority, Department of Agriculture	Ministry of Agriculture	For pesticides used in: agriculture — Ministry of Agriculture, industry — Ministry of Industry; households and public health — Ministry of Health	Institute for the Control of Agricultural Chemicals (ICAMA), Ministry of Agriculture	Plant Protection and Production Division, Ministry of Agriculture
Pesticide Registrar or Equivalent (Contact Person)	Dr. M.L. Saini, Secretary, Central Insecticides Board; Dr. V. Rangunathan, Director, Central Insecticides Laboratory	Dr. Satta Wigenasantana, Director of Food Crops Protection	Mrs. Pradhan, Chief, Plant Protection Division; Mr. Bhimsen, Pesticide Registrar	Dr. Ricardo Deang, Deputy Administrator for Pesticides	Dr. Nallini De Alwis, Pesticide Registrar	Dr. Montri Rumakom, Director-General, Dept. of Agriculture; Mr. Prayoon, Chief of Pesticide Regulatory Sub-Division, Ms. Yupa Leeleprute, Food and Drug Adm., Ministry of Health	Madam Zhang Chun Juan, Director, ICAMA; Mr. Zhang Baizhen, Deputy Director, ICAMA	Mr. Tran Qui Hung, Director, PPPD

11

	INDIA	INDONESIA	NEPAL	PHILIPPINES	SRI LANKA	THAILAND	CHINA	VIETNAM
Registration	Comprehensive registration system requiring full package of data, including efficacy, toxicology, residues. As a general rule, data package should be developed locally.	Local efficacy data required; local fish toxicity and residue studies may be required, but toxicity data accepted from abroad. Summaries of studies or mere information is accepted.	Registration system is not yet implemented.	Only efficacy data are locally developed, but even this may be waived. MRLs or tolerances, not set locally, but Codex MRLs accepted. Summaries of studies not accepted.	System very simple, with minimal staff. Local efficacy data required. Summaries of findings or any other information may suffice.	For pesticides used in agriculture, requirements are minimal at present, but more efficacy and residue data need to be developed locally under proposed regulation.	System fairly new and still being developed. Local efficacy data required, but for the rest, published information accepted.	Just started registration system. Any published information acceptable, although local efficacy trials will be required in future.
Data Assessment and Decision Making	Registration Committee reviews data and decides on registration. Central Insecticides Board decides on pesticide policies.	Pesticides Committee reviews all data and recommends registration. Evaluation based mainly on efficacy.	—	Pesticide Technical Advisory Committee evaluates data and recommends a decision to FPA.	Efficacy data referred for experts' review; others reviewed by Registrar, who decides on registration.	Data reviewed by Pesticide Committee, which decides on registration. Very minimal review, with emphasis on efficacy.	Evaluation Committee on Pesticide Registration reviews data and grants registration. Emphasis on efficacy.	No data review done; decisions based on information from other countries or international organization.
Labeling Requirements	Color coding based on toxicity; all languages printed.	Color coding implemented but not same as accepted FAO guidelines.	Draft label requirements incorporated in the legislation.	Color coding and use of pictograms implemented.	Labels per FAO guidelines but no color code.	Skull and crossbones on all labels.	Color code based on type of product.	New requirements to follow FAO.

4

	INDIA	INDONESIA	NEPAL	PHILIPPINES	SRI LANKA	THAILAND	CHINA	VIETNAM
Monitoring Programs	Regular monitoring of residues on food and horticultural crops; only occasional monitoring of other aspects of registration.	Limited monitoring of residues and other aspects of registration.	—	Minimal monitoring of residues; occasional monitoring of formulations.	Only occasional monitoring of formulations; none for residues.	Regular monitoring of residues for export crops; occasional monitoring of other aspects of registration.	Minimal monitoring of residues and formulations.	Minimal monitoring of residues and formulations.
Safety Programs	Regular training of pesticide distributors and retailers; occasional training of farmers and medical staff.	Regular training of pesticide retailers; occasional training of farmers and extension workers.	Minimal training of extension workers and farmers.	Certification program for pesticide retailers and pest control operators; regular training of medical personnel.	Occasional training of pesticide retailers and extension workers.	Regular training of pesticide retailers and extension workers; occasional training of medical personnel.	Occasional training activities for extension workers and farmers.	Occasional training activities for extension workers and farmers.
Enforcement Measures	Inspectors assigned to enforce regulations, but, in general, enforcement needs strengthening. Good control of imports and manufacturing facilities.	Limited number of inspectors, enforcement generally weak; imports controlled through licensing system.	No enforcement until the Act is implemented.	Limited number of inspectors, enforcement generally weak, but good control of imports through issuance of import permits by FPA.	Generally weak enforcement, except for the control of imports through permit issued by Registrar.	Very few inspectors, so enforcement is weak, except for control of imports through issuance of permits.	ICAMA enforces regulations but, because of limited number of staff assigned to do this, enforcement is generally weak.	PPPD is responsible for enforcement of regulations, but this needs strengthening and an increase in number of personnel assigned for the task.

24