PESTICIDE USE IN THAILAND

Boonchob BHATRARUJI*

Abstract

Agricultural production in Thailand depends heavily on pesticides to increase yield. The early importation of pesticides into Thailand was in the form of finished products. In order to reduce the cost of these pesticides some companies, later on, imported the technical grade ingredients and formulated them locally. Production of pesticides involves only the formulation of materials in liquid or solid form, which are all imported. The major companies importing and formulating pesticides are mostly related to multi-national corporations. Because of the availability of farm and water resources suitable for agricultural production, agro-chemicals will continue to be in high demand in Thailand. The Thai Government has a policy to promote pesticide industries in Thailand. The "National Committee on Fertilizer and Pesticide Industry Development" has been set up to develop the industry. Promotional privilege can be granted by the Board of Investment. Production and trade of pesticides in Thailand will be controlled by two Acts. The first one is the Industrial Article Act of 1969, which was amended in 1975. The other one is the Poisonous Article Act of 1967, which was amended in 1973.

Introduction

Thailand is located in a tropical area where there is plenty of rainfall which is suitable to grow a large variety of crops. The total land area of the Kingdom is approximately 518,000 km^2. About 81,000 km^2 are under cultivation of which 61,000 km^2 are devoted to rice farming, and 20,000 km^2 are taken up by such crops as coconuts, pararubber, field crops, fruit trees, vegetables and forest trees. It is estimated that 10% of the cultivated area of the country is devoted to upland crops such as corn, sorghum, cassava (tapioca), cotton, sugarcane, jute and kenaf. Thailand also grows many oil-producing crops such as castor bean, soybean, peanut, etc. Much of the land is under rotational cropping. From these diverse agro-ecosystems, Thailand has numerous pests which can inflict a considerable damage to agricultural production. They range from insects, plant diseases, weeds to rodents. It has been estimated that losses due to pests in Thailand accounted for not less than 115,000 million baht (US$5 billion) per year. Agricultural production in Thailand depends heavily on pesticides to increase yield.

Thus pesticides have become more and more essential to acquire good yield in cultivation. This can be noted from the increasing trend of pesticide importation into Thailand. These pesticides include insecticides, fungicides, herbicides, rodenticides and some other minor pesticides. Some facts about the pesticides in Thailand will be discussed in more detail.

The early importation of pesticides into Thailand was in the form of finished products. In order to reduce the cost of these pesticides some companies, later on, imported the technical grade ingredients and formulated them locally. In this case, the price is competitive in local markets and the products are considerably cheaper.

Production

In 1980, there were 10 important pesticide formulation factories in Thailand. Their names and capacity of production are shown in Table 1.

* Entomologist, Assistant Director, Entomology and Zoology Division, Department of Agriculture, Bangkhen, Bangkok, Thailand.

Table 1 Pesticide formulators and production capacity.

Name	Production capacity	
	Ordinary pesticides	Deadly pesticides
1. Chia Tai Seeds and Agricultural Co., Ltd.	1,060 tons	1,130 tons
2. Srikrung Watana Co., Ltd.	500,000 liters	26,000 liters
3. Bayer Thai Ltd.	175,000 liters	2,816,500 liters
	70 tons	2,350 tons
Bayer Laboratories Co., Ltd.	16 tons	
4. Union Carbide (Thailand) Co., Ltd.	2,220 tons	360,000 liters
		200 tons
5. Agro Chemical Industry Co., Ltd.	310 tons	570 tons
6. T.J.C. Chemical Co., Ltd.	34,560 tons	2,518,000 liters
	700,000 liters	1,100 tons
7. Shell Production (Thailand) Co., Ltd.	185 tons	1,296 tons
8. Pato Chemical Industry Co., Ltd.	120,000 liters	1,321,000 liters
	2,700 tons	500 tons
9. F.E. Zuellig (Bangkok) Co., Ltd.	320 tons	2,300,000 liters
	990,000 liters	200 tons
10. Hoechst Thai Ltd.	510,000 liters	500,000 liters
	20 tons	
Total	2,995,000 liters	11,310,500 liters
	41,461 tons	7,346 tons

Source: Ministry of Agriculture and Cooperatives.

Production of pesticides involves only the formulation of materials in liquid or solid form, which are all imported. The types of pesticides produced will depend on the popularity of brand name. New products may be produced and promoted locally. Low cost and highly effective pesticides will become popular in a short period of time. At present there is one factory which produces paraquat from raw materials, i.e. pyridine or bipyridine, and methyl chloride. There has also been an approval for the second paraquat factory, which is expected to be in operation soon.

Imports

Each year a large amount of pesticides is imported into Thailand, about 80% of which is in the form of technical grade ingredients. Table 2 shows the approximate amount of pesticides imported into Thailand from 1970–1980. It is seen that more than half of imports is accounted for by insecticides, with the next largest group being herbicides (Table 3).

It is seen that import of pesticides has been growing very rapidly. The major suppliers of pesticides to Thailand are West Germany, The United States and England. Table 4 shows import shares of pesticides from various sources in 1980.

Table 2 Imports of pesticides, 1976–1980.

Year	Insecticides		Fungicides		Herbicides		Total	
	A.I.* Value		A.I.* Value		A.I.* Value		A.I.* Value	
	(Ton)	($ million)	(Ton)	($ million)	(Ton)	($ million)	(Ton)	($ million)
1976	2,530	13.40	689	2.00	1,277	4.18	4,496	19.58
1977	4,006	17.34	1,130	2.95	2,857	6.84	7,993	27.13
1978	8,749	20.07	2,125	4.13	3,893	13.11	14,767	37.31
1979	5,500	32.10	2,024	5.12	5,927	12.38	13,751	49.60
1980	5,739	39.23	1,593	6.07	3,390	16.09	10,722	61.38

Source: Customs Department. * A. I. = Active Ingredients.

Table 3 Imports of pesticides by ingredients, 1980.

	A.I. (ton)	Market share %
Insecticides		
Syn. pyrethroids	24	12.9
Monocrotophos	377	11.1
Parathion	1,056	10.5
Carbofuran	142	6.4
Methomyl	98	6.3
Dimethoate	320	4.9
Methamidophos	179	4.6
Tax-DDT	667	3.0
Dicofol	268	2.7
Endosulfan	218	2.4
BHC	223	2.1
Others		33.1
Fungicides		
Copper Oxychloride	306	18.6
Zinc	365	14.6
Sulfur	428	6.1
Captan	54	5.4
Captafol	28	4.7
Apron	3	3.4
Propineb	48	2.9
Others		40.2
Herbicides		
Paraquat	661	33.3
Ametryn	228	10.8
Dalapon	674	7.9
Atrazine	230	7.2
Diuron	150	5.7
Dromaoil	53	5.4
Glyphosate	20	3.0
2,4-D	296	3.0
Alachlor	61	2.9
Avirosan®	21	1.9
Others		18.9

Source: Agro-Chemical Company.

Table 4 Sources of pesticide imports, 1980.

Country	Quantity/ton (A.I.)	Value/million $ US	Market share %
W. Germany	4,166.2	10.37	21
U.S.A.	3,897.3	12.22	19
England	2,581.3	6.14	13
Switzerland	1,121.2	4.24	5.5
Israel	1,055.8	2.54	5
Taiwan	886.6	3.3	4.4
France	479.4	1.1	2.4
Japan	299.6	2.94	1.5
Holland	180.0	0.58	0.9

Source: Ministry of Agriculture and Cooperatives.

Ownership and market share

The major companies importing and formulating pesticides are mostly related to multi-national corporations. This is because in order for the company to be competitive it has to rely on research and development to produce new technical grade ingredients, or the same ingredient at lower cost. Usually only large multi-national corporations have funds for research and development. Thus in Thailand the major companies for pesticides are Shell, Bayer, East Asiatic, Hoechst, F.E. Zuellig, Du Pont, etc.

Table 5 shows market shares of the major companies in pesticides.

Table 5 Market share in pesticides by company, 1975, 1980.

Company	Insecticides	Fungicides	Herbicides	Total	%
			1975 (2,518)		
Bayer	29.2	1.4	5.9	36.5	16.4
Du Pont	18.5	0	6.0	24.5	11.0
Shell	21.3	0.2	1.0	22.5	10.1
F.E. Zuellig (CIBA)	9.9	0.2	10.8	20.9	9.4
Union Carbide	20.7	0	0	20.7	9.3
East Asiatic (ICI)	0.7	0.3	17.9	18.8	8.5
T.J.C.	12.8	2.6	1.0	16.4	7.4
Thep Wattana	3.4	4.6	0.3	8.3	3.7
Metro	3.2	3.8	0	7.0	3.2
Yip In Tsoi	0	0.3	5.2	5.5	2.5
Others					18.5
Total	144.0	22.4	55.7	222.0	100.0
			1980 (2,523)		
Shell	117	0.3	3.4	120	10.3
Bayer	97	14	67	119	10.2
East Asiatic	19	0.1	84	103	8.8
Chia Tai	31	12	49	92	7.8
Hoechst	55	16	14	85	7.2
F.E. Zuellig	31	9	35	75	6.4
Du Pont	36	5	26	67	5.7
T.J.C.	53	2	11	65	5.6
Monsanto	39	0	25	64	5.4
Metro	22	4	13	39	3.3
Others					29.3
Total	723	62	326	1,173	100.0

Source: Ministry of Agriculture and Cooperatives.

Future prospect

Because of the availability of farm land and water resources for agricultural production, agrochemicals will continue to be in high demand in Thailand. This can be ascertained from the local consumption which is increasing every year. It is expected that during 1981–1985 the demand for pesticides will increase by about 60% in value terms. The annual demand forecast for the period is shown in Table 6.

Table 6 Demand forecast for pesticides, 1981–1985.

US$ million

Pesticides	1981	1982	1983	1984	1985
Insecticides	48.5	56.1	64.8	73.9	82.9
Herbicides	23.2	25.9	29.6	33.8	38.5
Fungicides	8.2	10.0	11.3	12.5	13.9

Source: Ministry of Agriculture and Cooperatives.

In the past it was rather unlikely to be able to produce materials for pesticides, because of the lack of basic materials and technical knowhow. But with the discovery of natural gas and the planned development of the petrochemical industry, Thailand now envisions to produce pesticide materials. For example, it has been estimated that the capacity of a factory to produce paraquat has to be at least 25 million liters per year in order to be competitive in terms of production cost. The production needs two kinds of raw materials, i.e., bipyridine and methyl chloride. Bipyridine can be produced from natural gas at 5,000 liters per day for this size of plant.

Government policy

The Thai government has a policy to promote pesticide industries in Thailand. The "National Committee on Fertilizer and Pesticide Industry Development" has been set up to develop the industry. Promotional privileges can be granted by the Board of Investment.

Production and trade of pesticides in Thailand will be controlled by two Acts. The first one is the Industrial Article Act of 1969, which was amended in 1975. The other one is the Poisonous Article Act of 1967, which was amended in 1973. According to this Act, no poisonous pesticide, listed in the Government Gazette, shall be brought in or imported or taken out of the country or manufactured for trade purposes, or bought by any person unless permission has been obtained from a government official.

Pesticides are subject to a low tariff rate of 5%, either in the form of finished products or ingredients. Thus the tariff structure does not provide much protection for local formulation and manufacturing. At present promoted companies which carry out the formulation are given 90% reduction on import taxes for imported ingredients, which helps reduce the cost somewhat. Considering the fact that the average level of protection is more than 20%, the present tariff level for pesticides may be too low for the industry to develop, unless the industry can be built on an international scale.

Discussion

Thyagarajan, G. (India): I would like to know on which basis you classified pesticides as "ordinary" or "deadly".

Answer: The classification of pesticides into ordinary, poisonous or deadly poisonous depends on their toxicity. The ordinary poisonous pesticides have a medium to low toxicity but the deadly poisonous ones are highly toxic. The latter ones can only be imported or exported under designated and specified conditions defined by the Customs Station, as promulgated in the Royal Government Gazette. Some of the highly poisonous pesticides include carbofuran, Monitor or methamidophos, cyanofenphos and omethoate.

Morallo Rejesus, B. (The Philippines): Did you classify pesticides as ordinary and deadly based on mammalian acute oral toxicity, that is: Highly toxic (0–50 mg/kg) as deadly pesticides

and the moderately toxic (51–500 mg/kg), slightly toxic (501–6,000 mg/kg) and those with negligible toxicity (above 6,000 mg/kg) as ordinary pesticides?

Answer: Yes, indeed.

Kajiwara, T. (Japan): You indicated that the amount of imported fungicides and herbicides decreased considerably in 1980 compared with 1979. What is the reason for such a decrease?

Answer: It may depend on market factors such as the promotion campaigns organized by the companies, particularly in the case of herbicides.